Gas Journal

VOL. 281, 107th YEAR, LONDON, JANUARY 12, 1955 No 4780, PRICE 1/3

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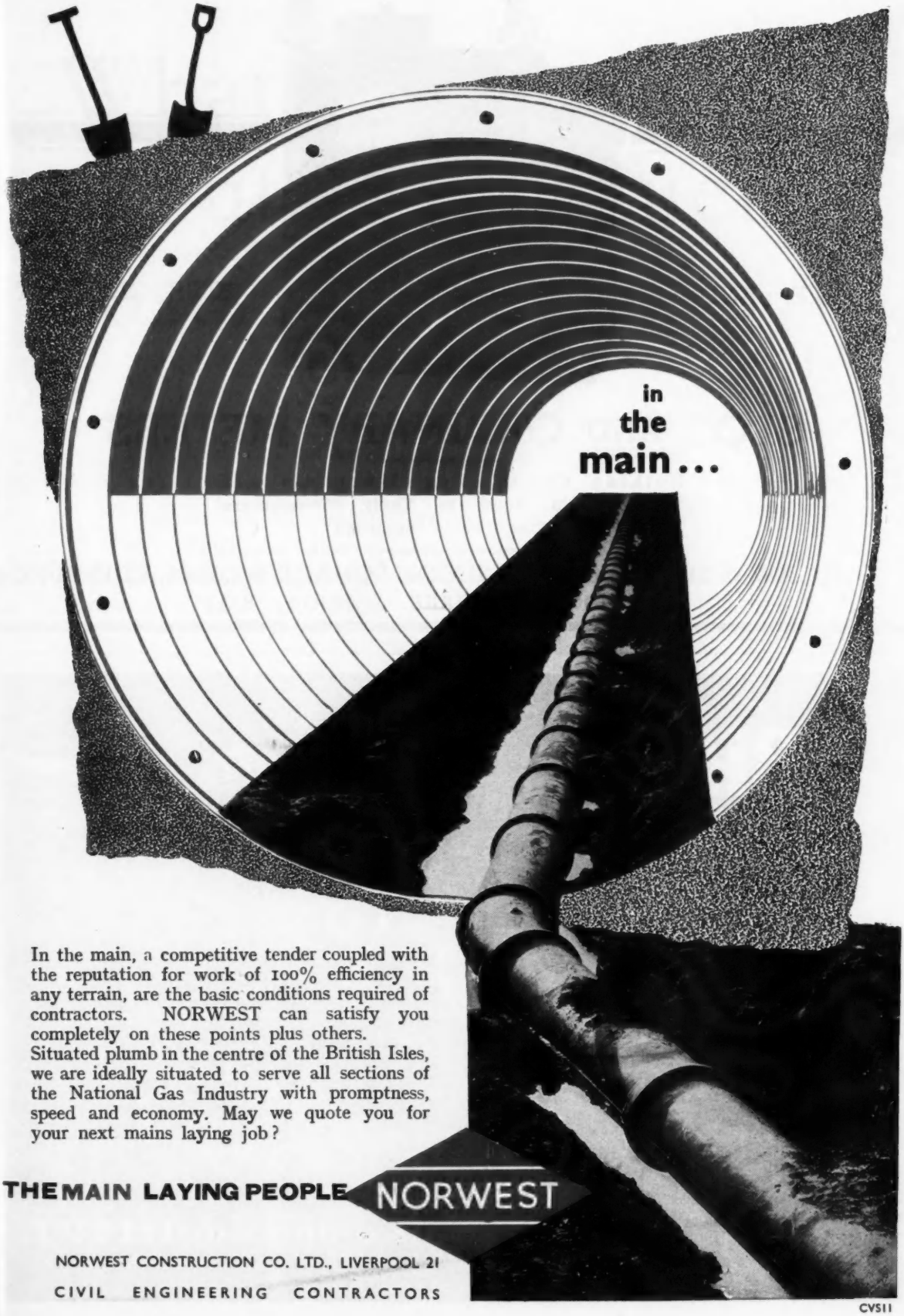

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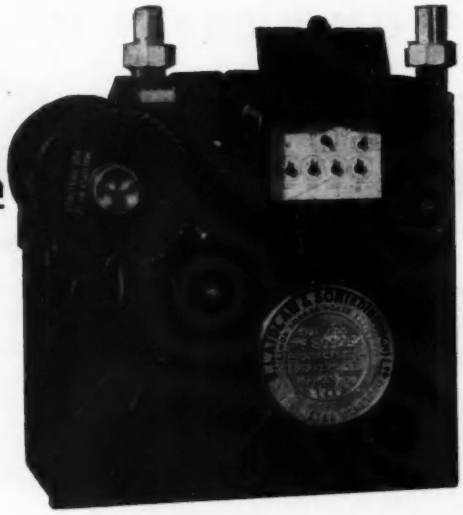

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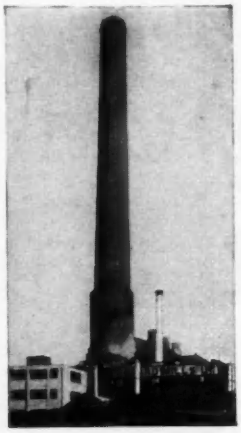
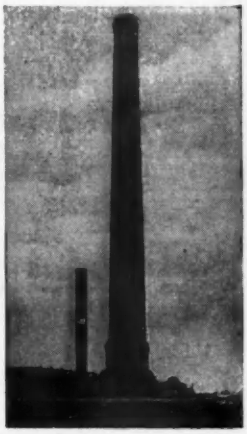
Left : Trial borings for reconstruction of Coventry Cathedral.





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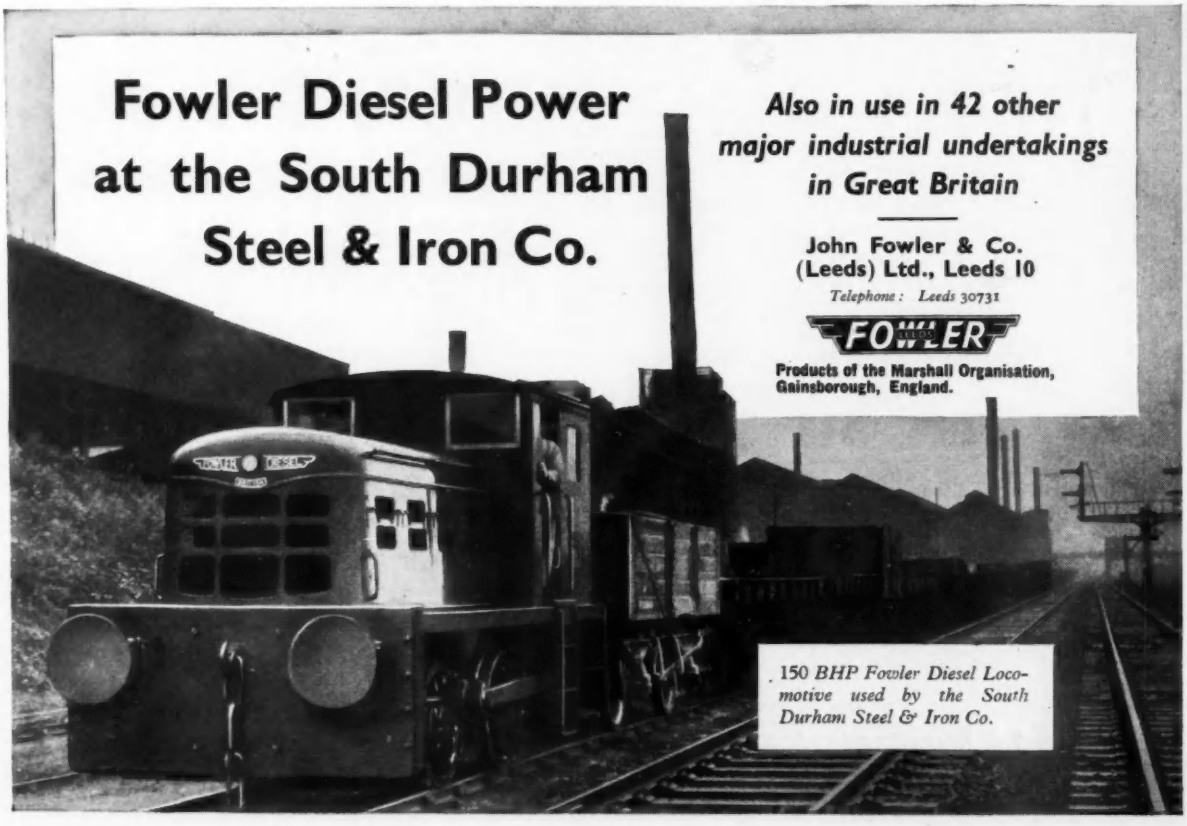

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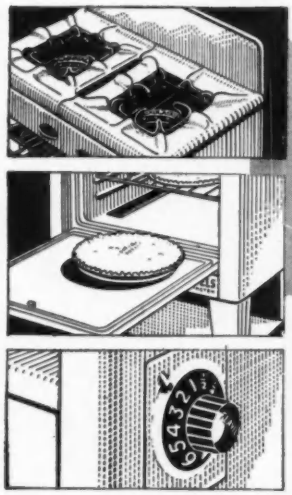

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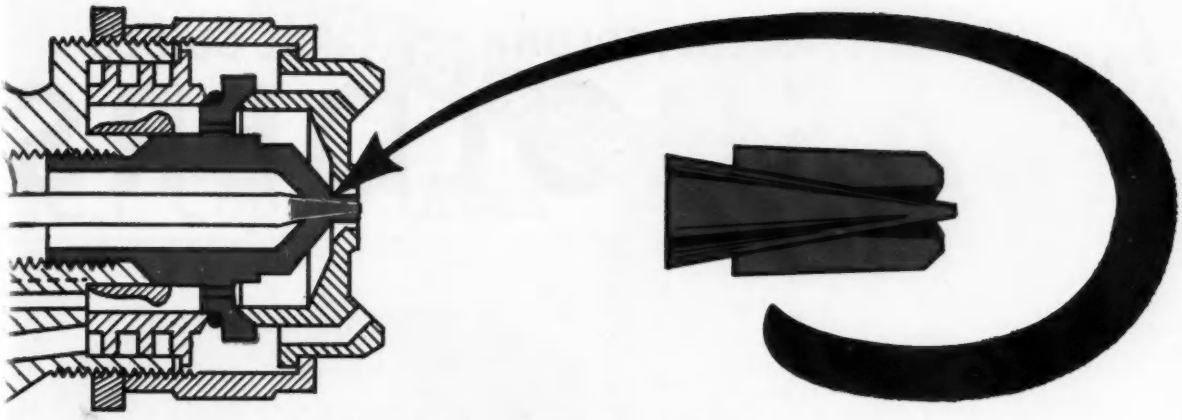

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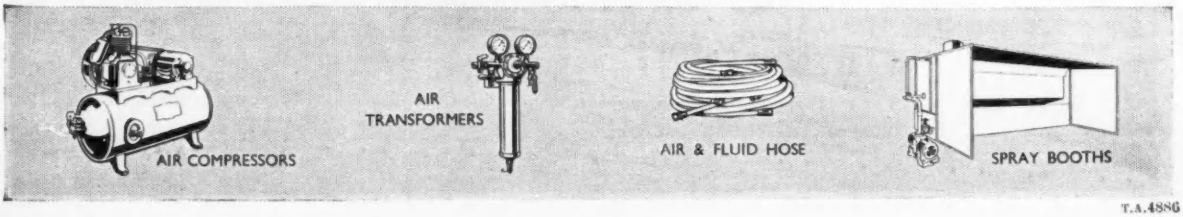

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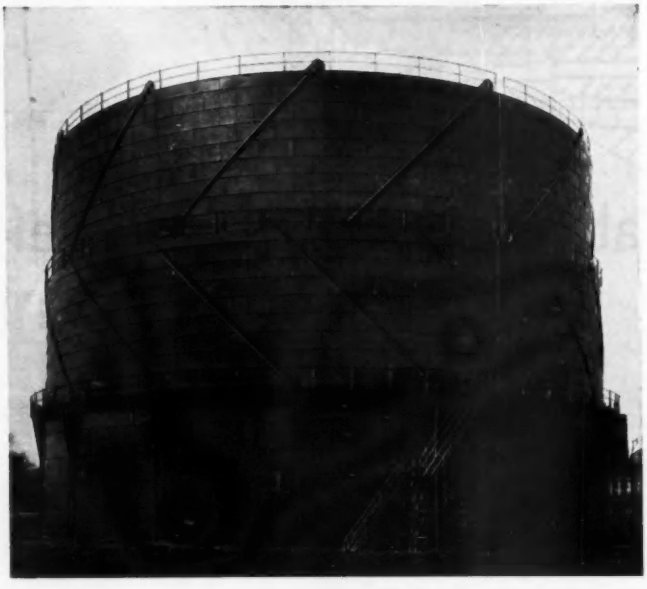

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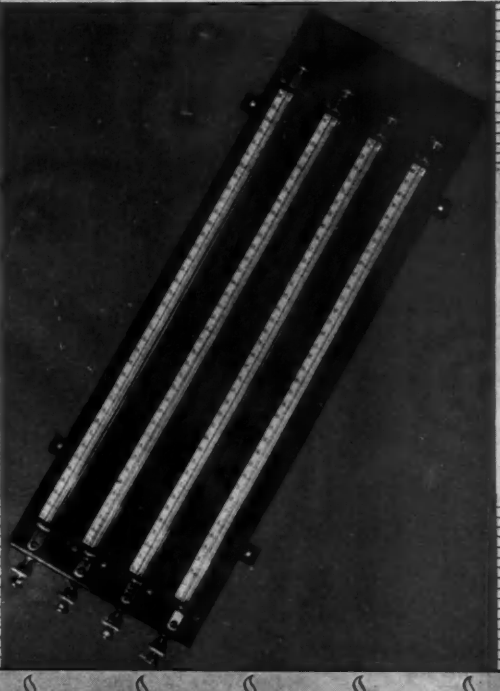

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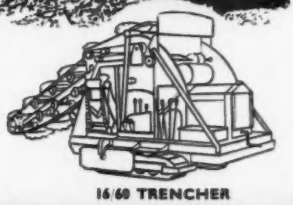

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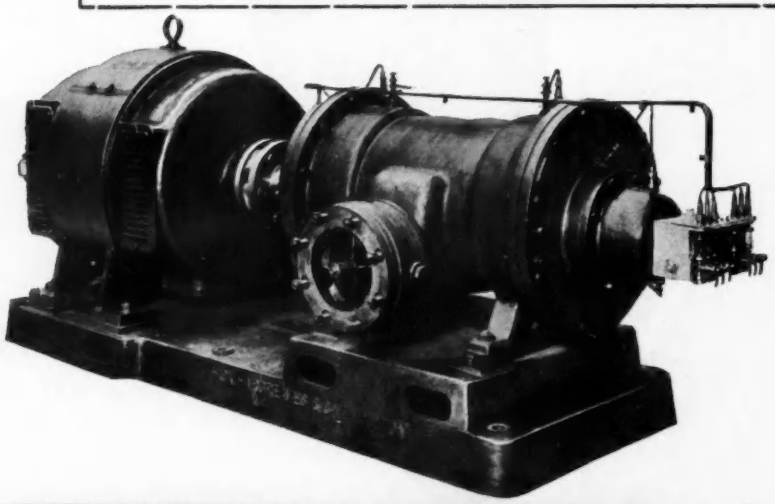

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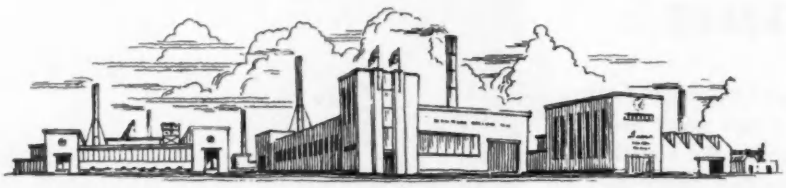

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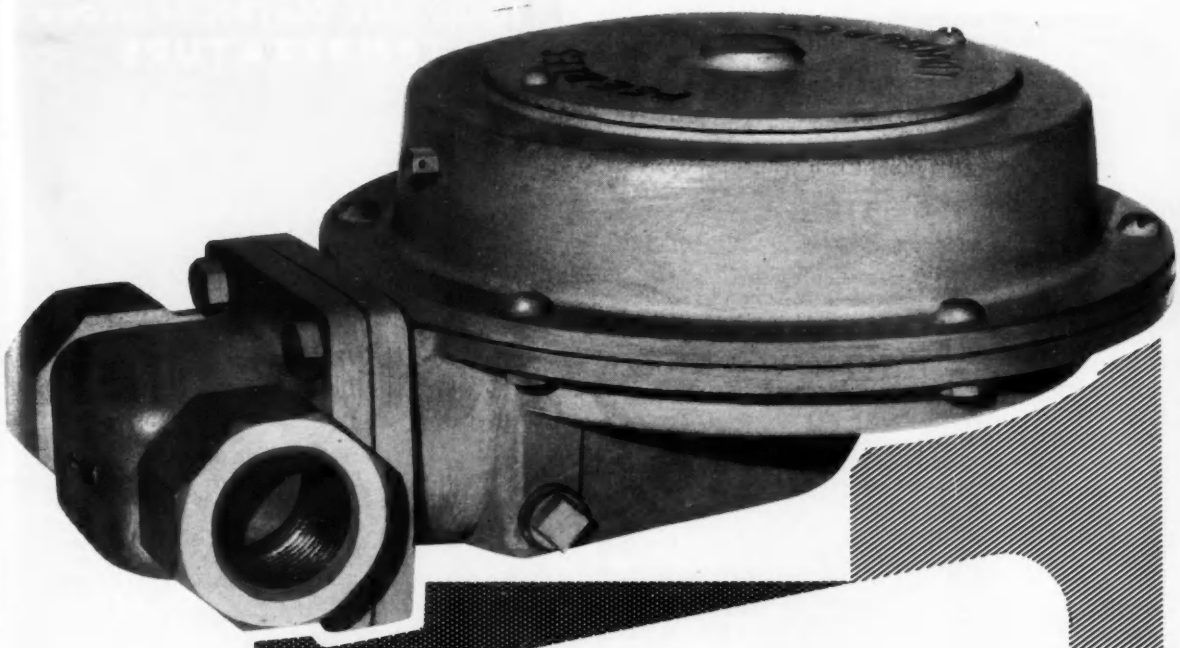

The Figure 103

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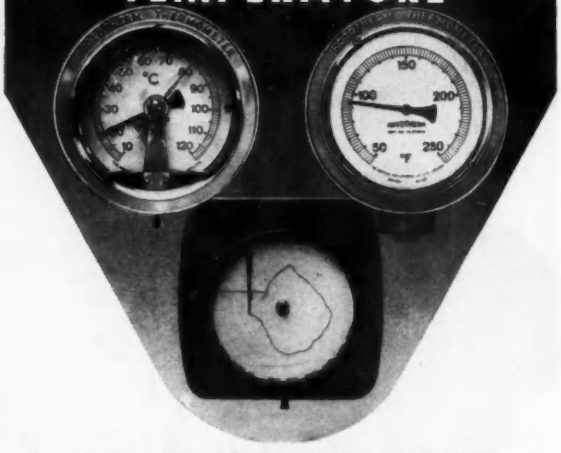

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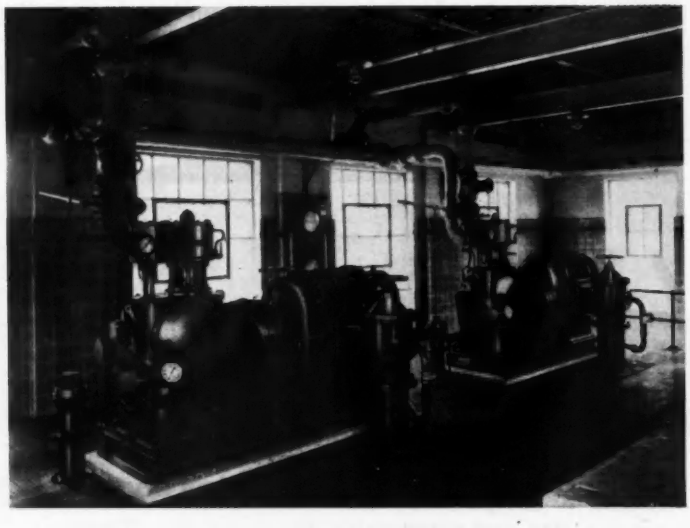

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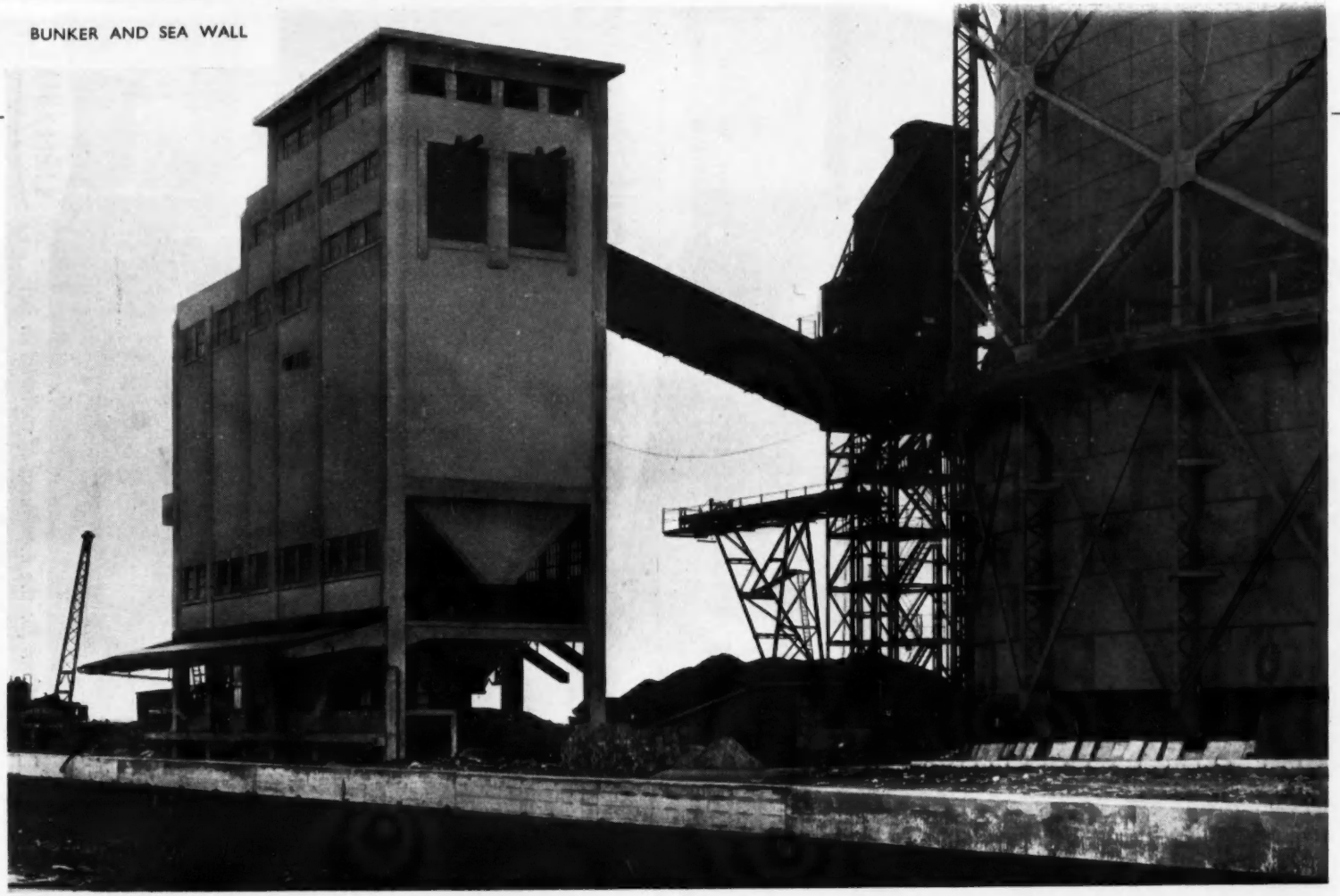

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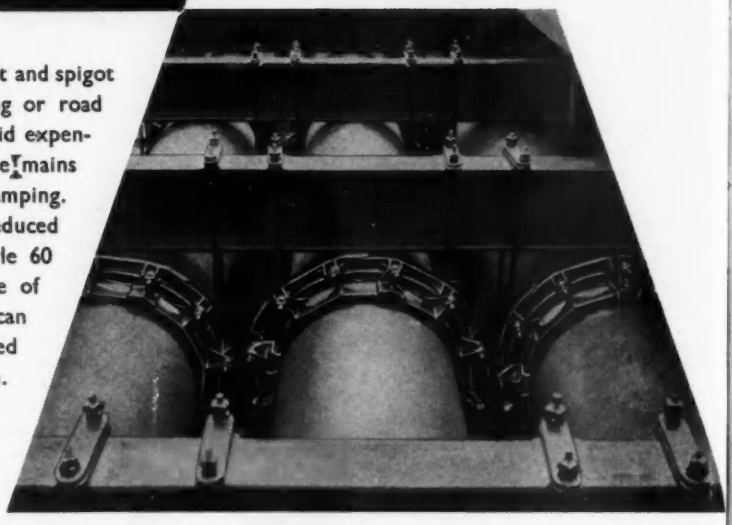

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FWS 43

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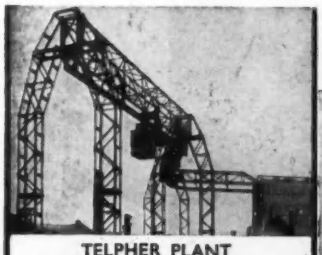
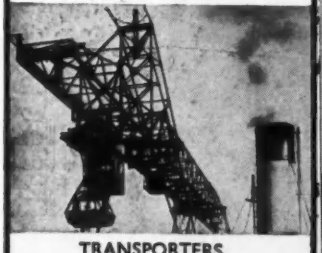
Installation of Coke and Ash Hoists on behalf of the Power Gas Corporation Ltd.



TELPHER PLANT



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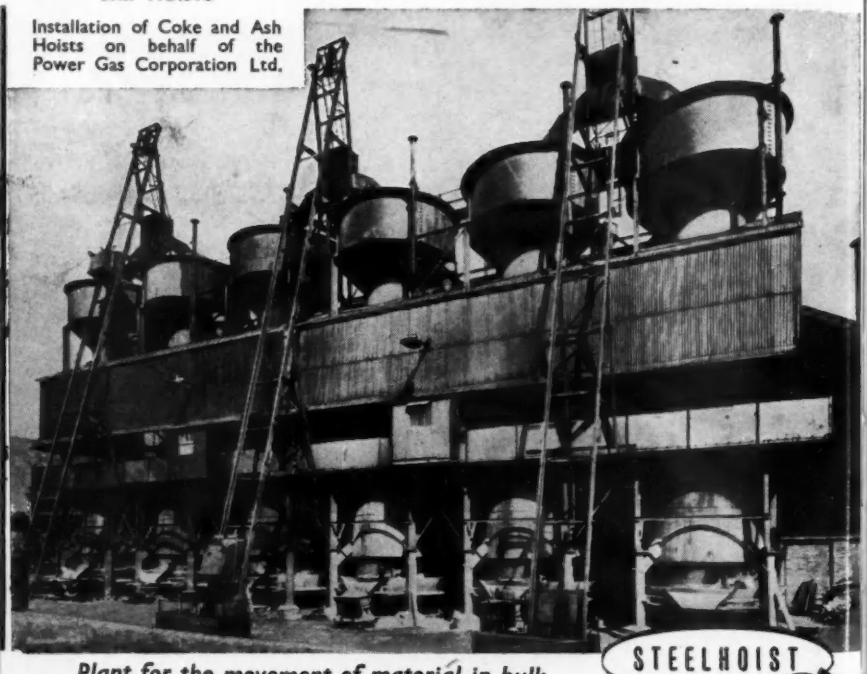

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★ *A Scottish proverb meaning that the best value often comes in small bulk.*

it's small - it's light - it's sturdy

Alder & Mackay, Ltd. Gas Meter Manufacturers,
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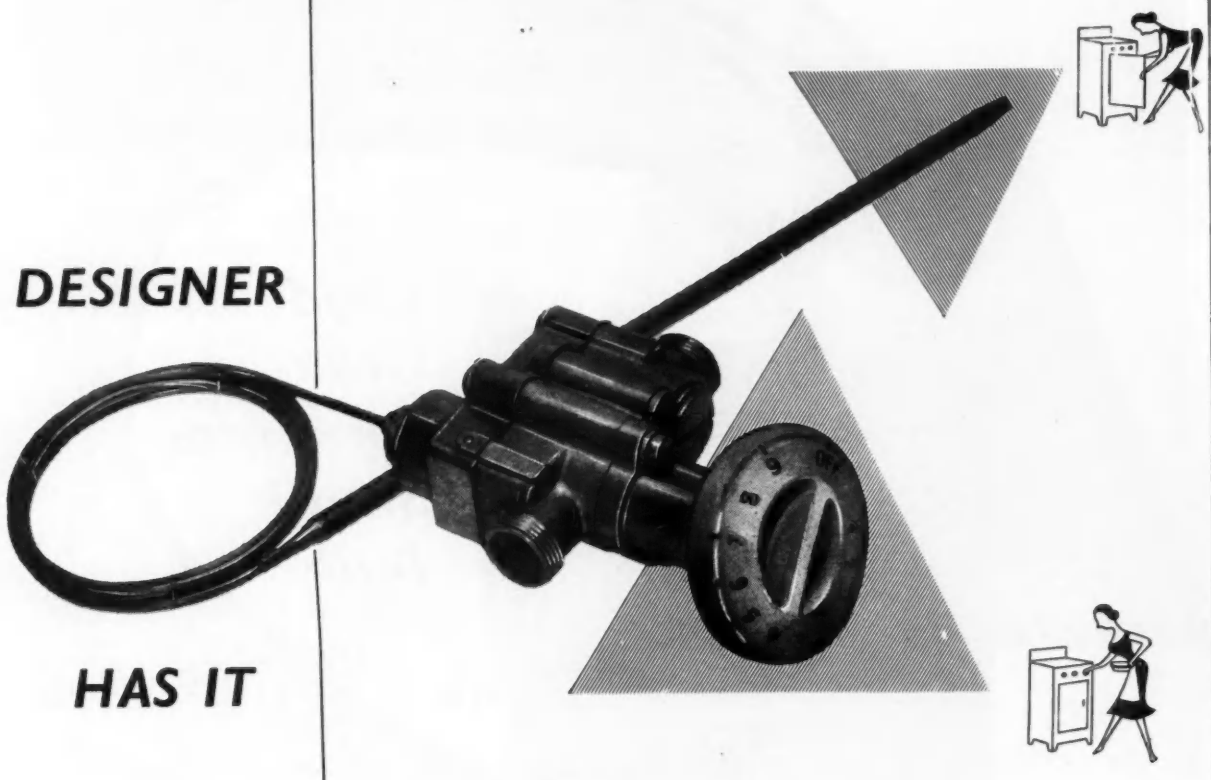

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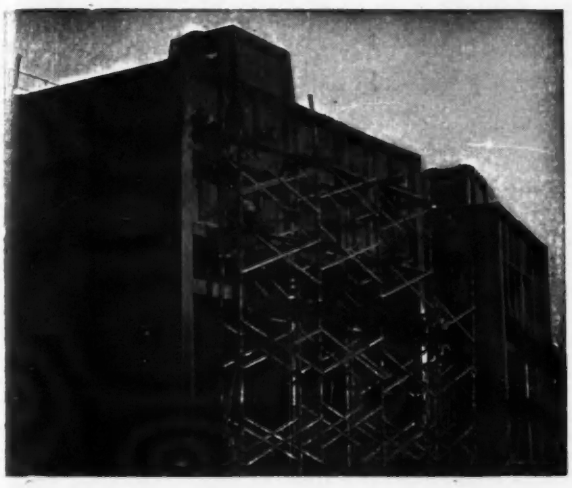

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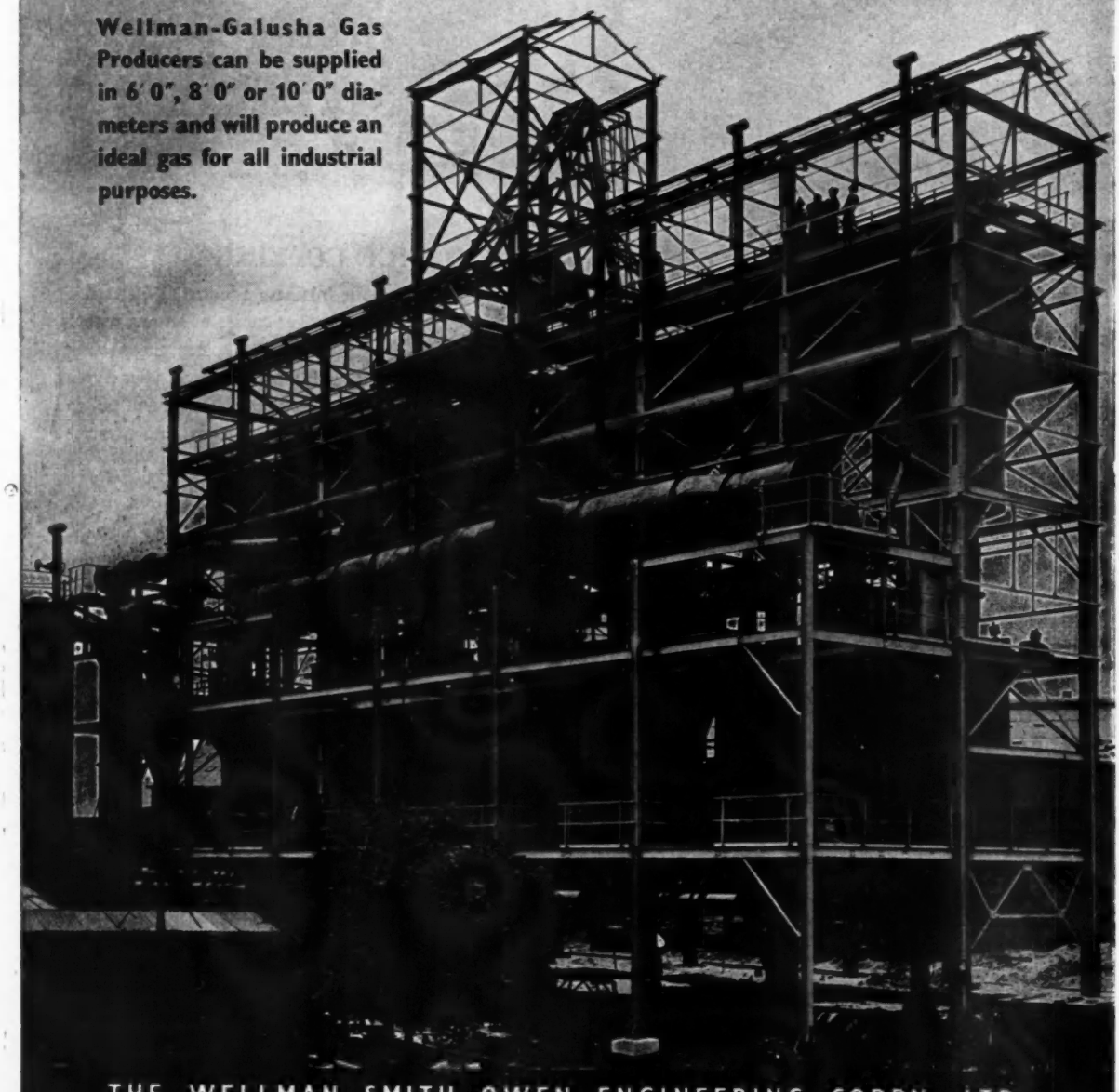

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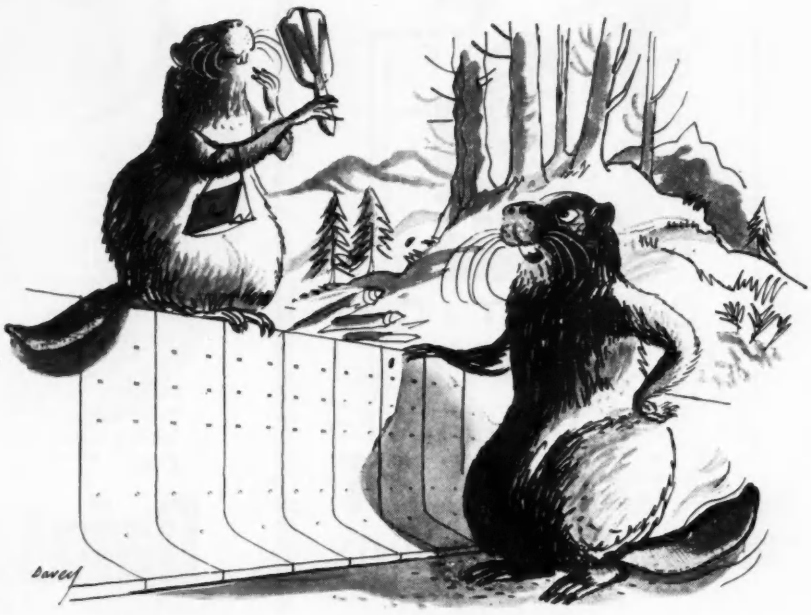

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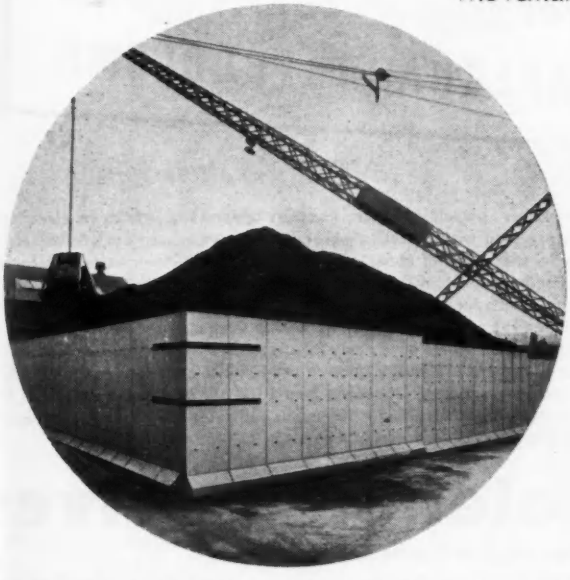

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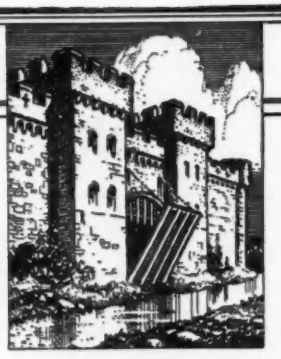

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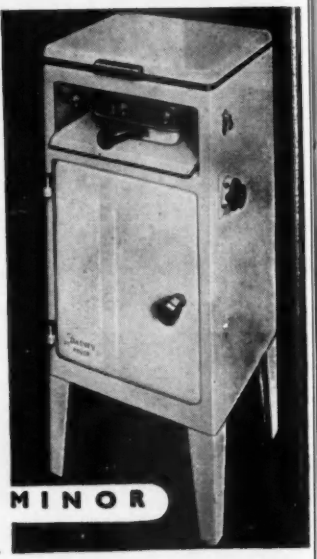

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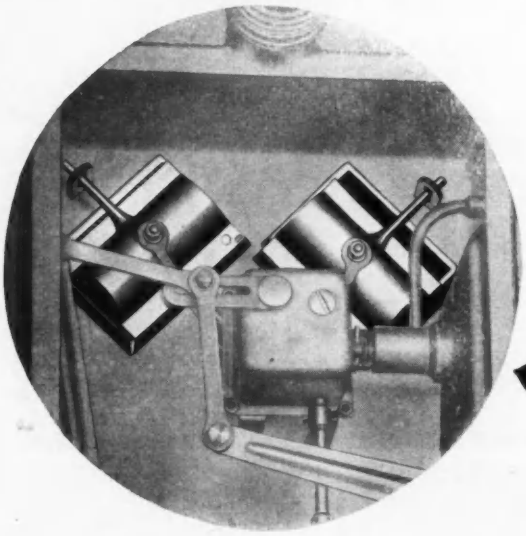

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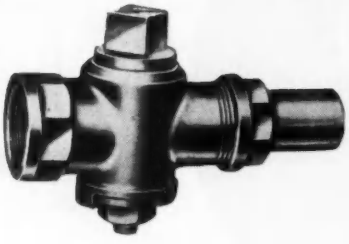

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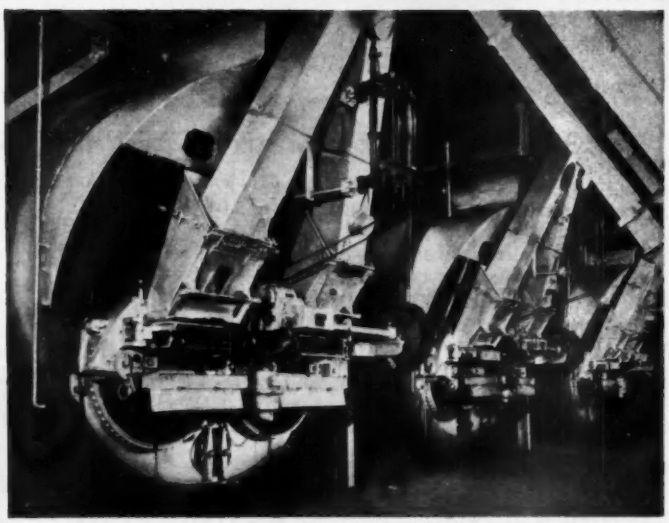

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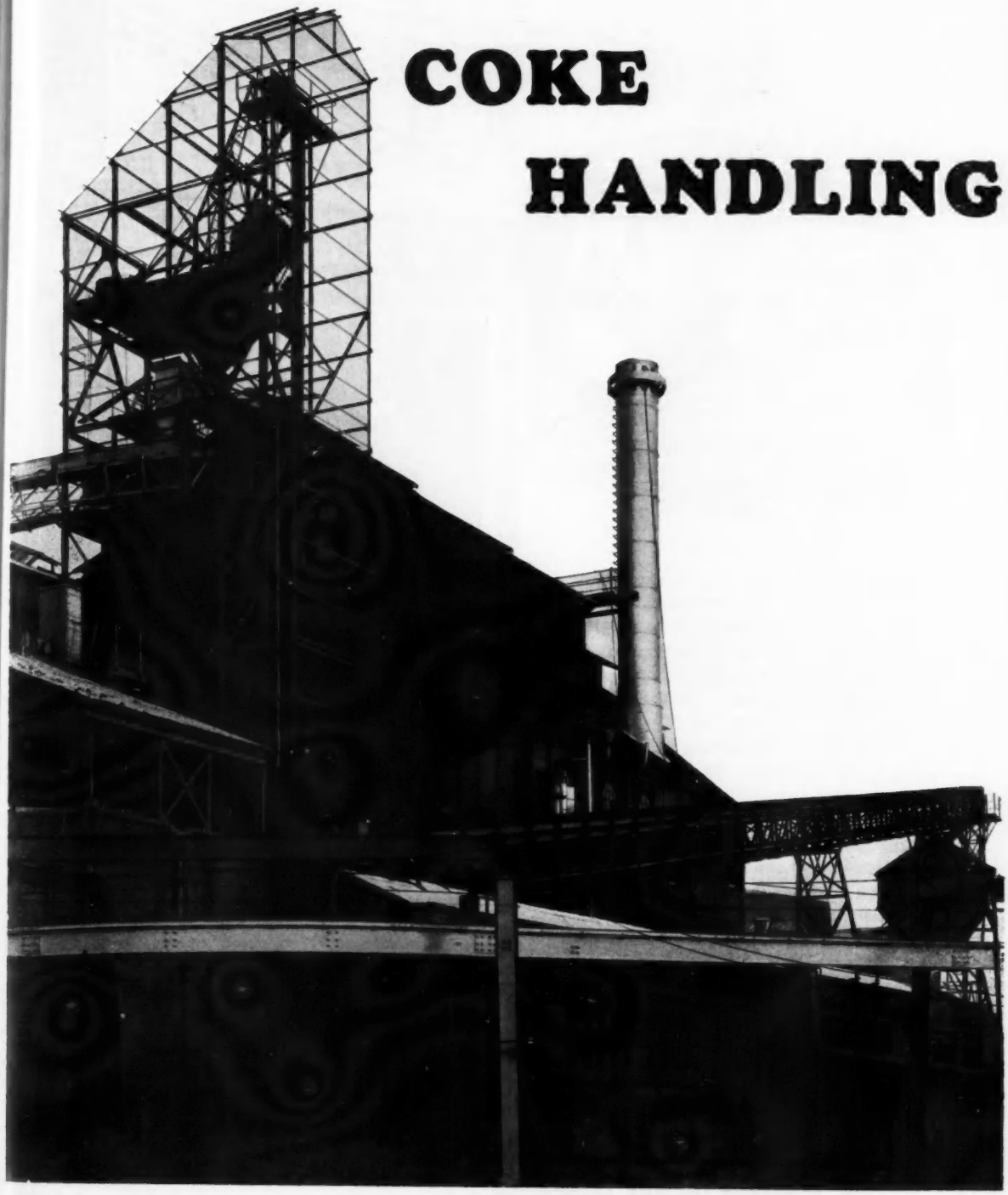

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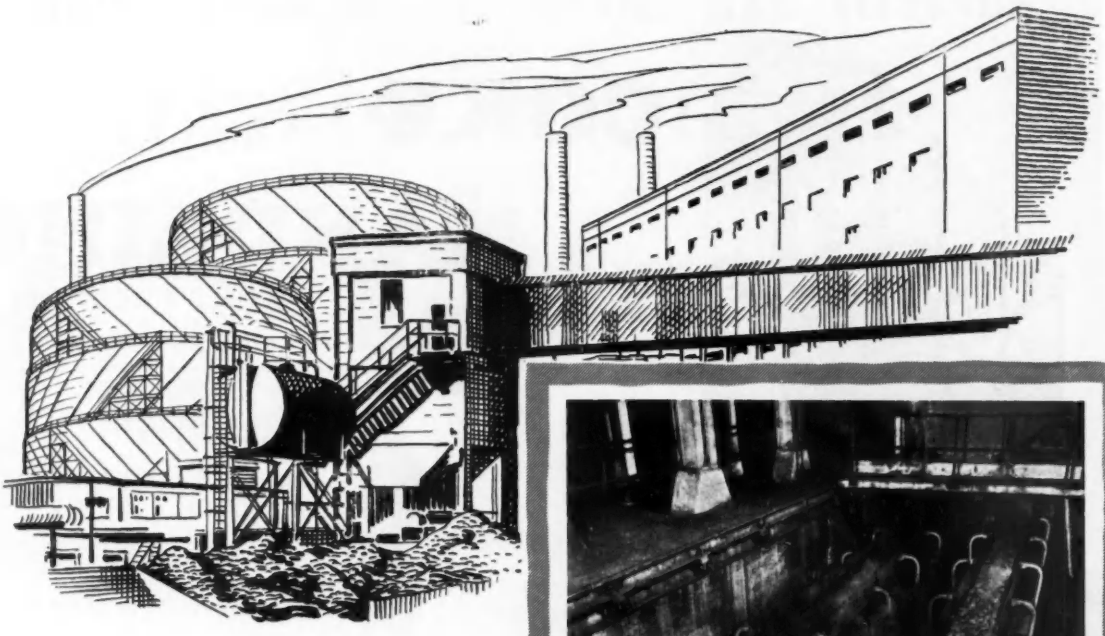

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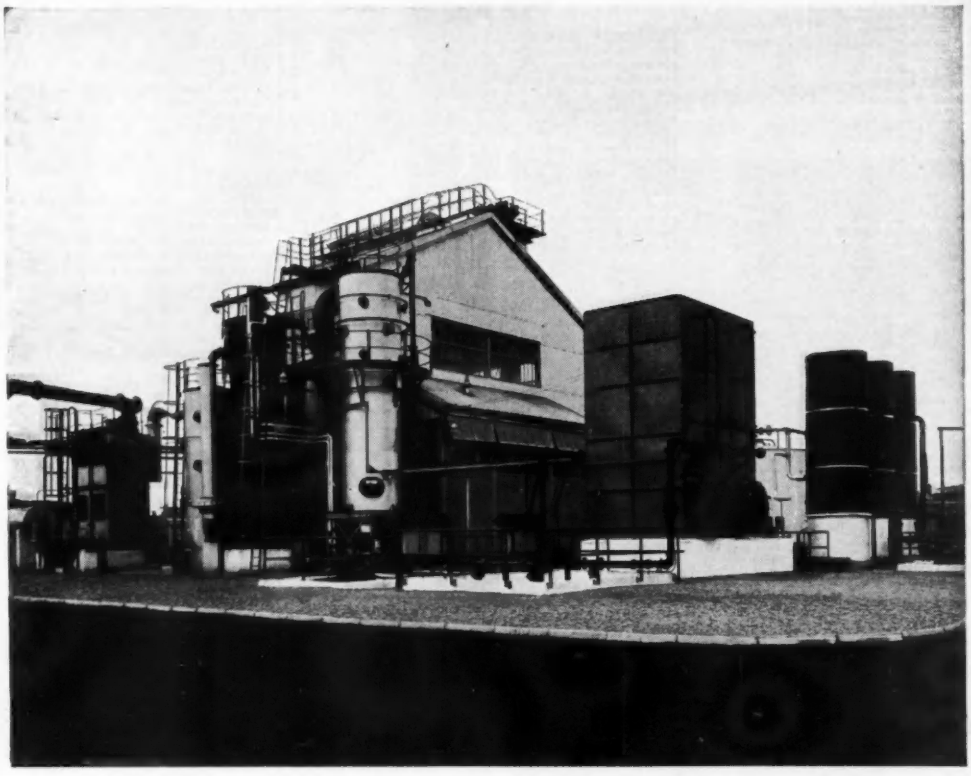

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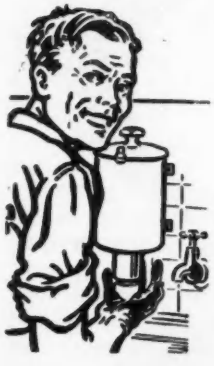

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DEB CHEMICAL PROPRIETARIES LTD., BELPER, DERBYSHIRE.

Gas Journal

VOL. 281 NO. 4780 JANUARY 12, 1955

107TH YEAR

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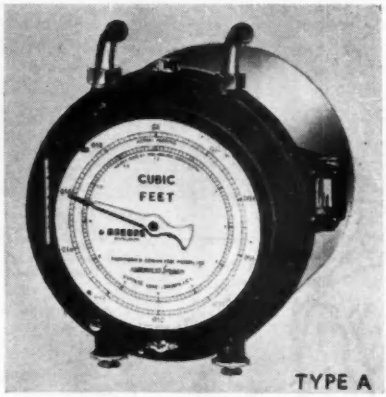

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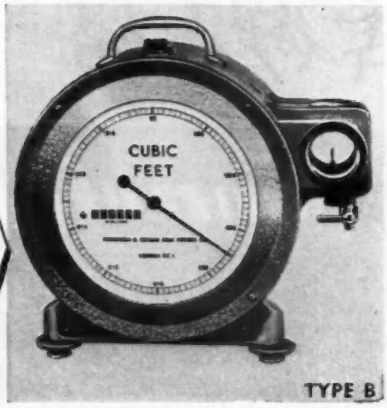

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Gas Journal

VOLUME 281. No. 4780. JANUARY 12, 1955. 107th YEAR

Making Ends Meet

EVERYONE reading these lines will have followed the progress of the negotiations leading to the removal of the railway strike notices, and though all are thankful that the strike is off—or at least suspended—nevertheless there will be those who have misgivings concerning the means used to attain this desirable end. A dire calamity has been averted and the anxiety of all as to the effect of a strike on the nation's economy is relieved. But a new anxiety has arisen in its place—not so pressing perhaps, but just as real for all that. This has to do with the way in which the settlement was reached, for there can be no doubt that expediency was the operative word in the negotiations, while legal obligations and financial considerations took a back seat. In fact it would seem that the Government was determined to stop the strike at all costs, even though this meant the overthrow, for some considerable period, of the Transport Commission's efforts to remain solvent.

Two of the most significant features of this particular dispute have been the Interim Report of the Committee of Inquiry appointed by the Minister of Labour on December 23, and the subsequent reactions to its findings. In the course of the Report the Committee instituted a new and highly controversial principle concerning the wages of those employed in nationalised industry. The relevant part reads as follows:—

'At this point we come very close to the core of the matter, and we feel that we must state in the plainest of terms what we apprehend to be the proper approach. The nation has provided by statute that there shall be a nationalised system of railway transport, which must therefore be regarded as a public utility of the first importance. Having willed the end, the nation must will the means. This implies that employees of such a national service should receive a fair and adequate wage, and that, in broad terms, the railwayman should be in no worse case than his colleague in a comparable industry.'

The Report goes on to suggest that the fact that the payment of such wages would cause a further increase in the railways' already considerable deficit is not to be considered an argument for not paying them. If this means anything, it surely implies that the Transport Commission ought to allow its deficit to continue, and abandon, at least for the time being, any attempt to meet what it considers to be its financial obligations under the regulations of the Transport Act.

The more one examines this proposal, the more disturbing it appears. It is only common justice that the railwaymen should receive an adequate wage. The economic stability and welfare of the nation demand it. It is the wider implication of the proposal that is so dangerous. As a trading nation, Britain can maintain only that general standard of living which will enable it to compete successfully with other nations for the world's markets. If the proposal of the Court of Inquiry is followed to its logical conclusion all the nationalised industries could turn a blind eye to the balancing of their accounts, providing they were satisfied that their employees were receiving 'fair wages.' Who would decide what these fair wages were?

Thus a chaotic situation might arise, one which could not last for long. Any losses sustained by the nationalised industries would have to be made good from some source, and where else than from users, consumers and taxpayers—in other words, from the people as a whole?

Such an arrangement could have no other result than the lowering of the standard of living of those employed in private industry compared with those in nationalised industries, and would soon evoke a wave of fresh wage demands in industry generally. In no time at all the selling prices of the finished products of our great manufacturing industries would go up by leaps and bounds and we should find ourselves priced out of the world's markets. A grim picture maybe, but the obvious end to an inflationary spiral such as might come about if the Committee's Report is accepted without reserve.

Fortunately for our industry, its industrial relations are good and its standard rates of wages compare favourably with those in other industries where conditions are similar. In the gas industry all workers receive three weeks holiday, including Bank holidays, each year with pay; furthermore there are generous pension and sick pay schemes. Few would deny that these are extremely valuable benefits and worth a considerable amount in cash equivalent. True there are differences between one board and another in the salaries paid to technical and administrative staffs; certainly it cannot be said that the engineers and technicians of the industry are overpaid considering the responsibilities they carry and the qualifications they require. In the main, however, both salaried and weekly staffs have

an innate sense of vocation, and appreciate that they are contributing to an essential public service. Perhaps it is significant that this sense of duty is most strongly developed in the senior grades of employment. In any case it is clear that it is one of the strongest bulwarks of the industry's stability and should be assiduously cultivated. One thing is certain, the gas industry as at present constituted has a statutory obligation to make ends meet financially, taking one year with another, and only disaster could follow any abandonment of this principle. All semblance of incentive to greater efficiency would be lost, and the industry would be at the mercy of every pressure that could be brought to bear upon it. It must also be remembered that, as things stand, gas is in competition with electricity and oil; the one nationalised and the other a private industry. The prosperity of gas, even its continued existence, depends on its ability to face this competition and surmount it.

It may be that nothing further will come of the new principle, which would appear to have been accepted by the Government and the Transport Commission only for the present emergency. On the other hand, such a principle, once acted upon, though officially dead, 'may refuse to lie down.' The final report of the Committee and the Government's official reaction will be anxiously awaited by all the nationalised industries, for much will depend upon both of them.

SCHOOLBOYS' EXHIBITION

THE way to a man's heart is reputed to be via his stomach. Much the same can be said of boys' hearts, except perhaps that the route is somewhat shorter. No doubt it was this point which prompted the Gas Council to provide 'tuck' on their stand at the Schoolboys' Own Exhibition, which closes tomorrow after a 13-day run at the Horticultural Halls, Westminster. The idea is a sound one, and delighted crowds of youngsters await their samples of Baked Alaska (ice cream cooked within an insulating shell of meringue) demonstrated by Miss Jill Rowe of J. Lyons & Co., Ltd. Equally popular are the doughnuts which are prepared on another part of the stand. Young visitors have the opportunity to learn how to prepare and fry these doughnuts, although what their mothers will say when they want to repeat the experiment at home is best left to the imagination. Doughnut frying —and eating—is apt to be a sticky operation, and the Council has thoughtfully provided washing facilities, hot water being supplied from a multi-point water heater. Small boys were queuing up to wash their hands when we visited the stand—no doubt it was the novelty which appealed to them. These three operations—cooking Baked Alaska, frying doughnuts, and providing hot water —illustrated certain of the uses of gas, and we were pleased to note that enquiries and requests for literature were being dealt with in a sympathetic and generous fashion. The stand is one which invites the visitor to come back again and to stay as long as he wishes, provided, of course, that he is not swept away on a rising tide of scrabbling British youth.

The same cannot be said for the stand of the British Electrical Development Association, where visitors are admitted in batches, and only permitted a short time in which to see the exhibits. However, these exhibits are well worth seeing, and the crashed flying saucer and mumbo-jumbo of science fiction has been brilliantly displayed. We were particularly impressed, as it seems were the schoolboys, by the trouble which had been taken to produce a remarkable comic called 'Electronic World,' complete with strip cartoons on interplanetary travel, and some excellently presented information about electricity and electric appliances. This exhibit showed a wealth of imagination, and it would be nice if in future years something of an equally extravagant nature could be devised for the gas stand. This is not intended as a criticism of this year's gas exhibit, but rather, a suggestion that a schoolboy of today has more developed tastes and interests than his counterpart of even 10 years ago.

TWO BIRDS—ONE THERM

THE growing realization of the danger of air pollution, intensified by the publication of the Beaver Report, has provided the gas industry with one of the best opportunities for publicity in its long and honourable history. It is perhaps fortunate for us all that this challenge is of a kind likely to find prompt acceptance by the Gas Council. The story is first-class, and the Council has right on its side, but surely few organizations of this nature could have produced an advertisement layout making quite such an impact on the reader as the current 'Killing Two Birds with One Therm'. The two vultures in this drawing, whose horrid gaze menaces us from (it seems) every newspaper we pick up, bear across their respective waistcoats the inscriptions 'Waste of Wealth' and 'Menace to Health'. Nine lines of well written copy explain just why Mr. Therm kills the two hateful birds, thus saving us from smoke which, to quote one phrase 'is not only a menace to health—it is the funeral pyre of wealth.' Below comes the neat rhyme: 'Gas and Coke—Heat without Smoke.' To our way of thinking this is a first-class advertisement, and it is nice to know that we are not alone in this belief. We understand that its appearance has created more comment—favourable comment that is—than any for a long time, and that the Gas Council's postbag has been heavily weighted with letters of praise. We are glad to hear it, and we suggest that, notwithstanding some of the hard things which have been said about Gas Council advertising in recent months, this layout, and the two others having a similar theme, support the belief that at this sort of thing, the Council has the ability to hit the nail squarely on the head.

CONFERENCE ON WELDED STRUCTURES

The papers presented at the Conference on Welded Structures held in London on November 23-26, 1953, and a record of the discussion, have been published in book form by H.M. Stationery Office at 40s. The object of the conference was to review present knowledge and outstanding problems in the design, fabrication, and erection of welded steel structures. It was organized by the Ministry of Works, the Institution of Civil Engineers and the Institution of Structural Engineers, and was supported and sponsored by five other Government departments and 15 professional and technical organizations and associations.

Twelve papers were presented during the seven sessions of the conference. Many examples were given of the savings of weight and cost which could be effected by the use of welding instead of riveting. Mr. W. A. Mitchell, in his paper, 'The Design of Welded Steel Frames for Multi-Storey Buildings', took a typical city building for offices and similar purposes. His tables showed that for the building as a whole, by using welding instead of rivetted construction it should be possible to save 5-10% of weight and 2½-5% of cost.

The Chairman of the final session, Mr. R. Jenkin, said it could justly be held that, as a result of the papers discussed, the objective of the conference had been achieved. The conference had shown that both weight and cost could be saved, that designs could be simplified and shop efficiency improved. They had had an excellent review of many problems—labour problems, brittle fracture, the cost of inspection, and the effect of weather conditions and distortion, to mention but a few.

Personal Notes

NEW YEAR HONOURS

By a printers' error four names were accidentally omitted from our list of New Year Honours of interest to the gas industry published last week. They were:

KNIGHTHOOD.—MR. IVOR RICHARD COX, D.S.O., for services as Managing Director, Metropolitan Vickers Electrical Co., Ltd.

O.B.E.—MRS. DEODORA CROFT, widow of the late Colonel C. M. Croft, Past President of the Institution of Gas Engineers and of the International Gas Union, 'for political and public services in Wandsworth'; and MR. V. W. M. ROBERTS, Commercial Manager, Electronics Department, British Thomson-Houston Co., Ltd., Rugby.

M.B.E.—MR. FRANK MARRIOTT, Works Manager, Head Wrightson Steel Foundries, Ltd., Stockton-on-Tees.

MR. E. B. FIELD, Assistant Divisional General Manager, Sheffield and Rotherham Division, East Midlands Gas Board, has been appointed Deputy Divisional General Manager, Sheffield and Rotherham Division, as from January 1.

MR. ERNEST HARDIKER, for many years Manager of the Smethwick undertaking and latterly Divisional General Manager of the Walsall and District Division of the West Midlands Gas Board, who retired on January 10, has been presented by the employees with a fitted wardrobe.

MR. JOHN L. ANSTEY, Sales Manager of the Parkinson Stove Co., Ltd., has been appointed Sales Director. He joined the Company as a junior representative in January, 1946, on demobilization from the R.A.F., and in 1948 was appointed senior representative in the East and West Midlands Gas Board areas. Two and a half years later he was promoted to Midlands Area Manager, and in November, 1952, to the post of Sales Manager. He is a Member of the Sales Managers' Association, and is an Associate of the Institution of Gas Engineers, and the Scottish Association of Gas Managers. Mr. Anstey is well known in the Midlands for his sporting activities, having recently completed three years as the youngest-ever President of the Warwickshire Rugby Football Union, while last year he relinquished the Presidency of the Kenilworth Rugby Football Club, after holding that office for five years. He is also a playing and committee member of the Coventry and North Warwickshire Cricket Club. Before the war and immediately afterwards he was with the Coventry Corporation Gas Department.

MR. W. V. OLSSON, Chief Internal Auditor at the headquarters of the West Midlands Gas Board, has been appointed to the new post of Organization and Methods Officer of the Board. His successor as Chief Internal Auditor is MR. J. H. SMITH, formerly Deputy Divisional Accountant at Walsall.

MR. H. P. PENTELOW, after 51 years with the Trafford Park Works of Lancashire Dynamo & Crypto, Ltd., retired at the end of 1954. His first six years with the Company were spent between the works, the design department, and the contract department, but practically the whole of his service had been devoted to the electrical application of heavy machine tools—particularly the electrical driving of planing machines. In fact, said Mr. Eaton in making a presentation on behalf of his colleagues, it is no exaggeration to say that the name of Pentelow is associated throughout Great Britain with the Lancashire planer drive and Mr. Pentelow could be proud that his work had formed such a valuable contribution to the prestige of the Company's products in this particular field.

MR. H. A. EDKINS has been appointed Assistant Sales and Service Manager to the West Midlands Gas Board. He started his business career in the City of Birmingham Gas Department and had extensive training in the fittings and administrative sections. A product of the H.A.C. Field Gunnery O.C.T.U. he had six years of war service, including four years in the Far East, and attained the rank of Major. Returning to civilian life in 1946 he rejoined the Birmingham undertaking as assistant to the fittings superintendent. In 1949 Mr. Edkins was appointed personal assistant to the manager of the fittings department, and in 1950 he was seconded to the headquarters staff of the West Midlands Gas Board as personal assistant to the sales and service manager. He is at present attending the Gas Council's residential course in management at Brooklands Technical College.

Obituary

COUNCILLOR W. N. BACON, a member of the North Thames Gas Consultative Council nominated by the Corporation of the City of London since the Council's inception in 1949, died on December 10.

Many old friends will regret to learn of the death, on January 5, after a prolonged illness of MRS. NELLIE B. TOWNSEND, J.P., widow of Mr. W. W. Townsend, Managing Director and Engineer of the Colchester Gas Company, who died in January, 1940. Our sympathy is extended to her sons, Mr. John and Mr. Charles Townsend, and to her daughter, Mrs. Frank Dawson.

Diary

Jan. 14.—SCOTTISH JUNIORS (Western District): 'Letting Steam Off,' J. R. MacOwen. 522, Sauchiehall Street, Glasgow, C.2. 6 p.m.

Jan. 15.—YORKSHIRE JUNIORS: 'Coke—The Smokeless Fuel,' W. I. Ineson. Harrogate.

Jan. 17.—WEST MIDLANDS G.C.C.: Committee Room, Gas Offices, Edmund Street, Birmingham. 2.30 p.m.

Jan. 18.—LONDON AND SOUTHERN SECTION, I.G.E.: 'Sales and Service Organization at Tottenham,' S. A. King and J. E. Law. 17, Grosvenor Crescent, London, S.W.1, 2.40 p.m.

Jan. 18.—BRITISH INDUSTRIAL MEASURING AND CONTROL APPARATUS MANUFACTURERS' ASSOCIATION: Annual Luncheon, Londonderry House, Park Lane.

Jan. 20.—MIDLAND JUNIORS: Visit to The Jeavons Engineering Co., Ltd., Tipton.

Jan. 20.—INSTITUTE OF FUEL: 'The Beaver Report,' Discussion to be opened by Dr. G. E. Foxwell, at the Institution of Civil Engineers, Great George Street, 5.30 p.m.

Jan. 20.—LONDON JUNIORS: Visit to a coal mine in the Cannock area.

Jan. 22.—WESTERN JUNIORS: 'Industrial Development in the Rural Areas,' E. I. Luscombe. Exeter.

Jan. 26.—EASTERN JUNIORS: 'Steam Utilization in the Gasworks,' G. S. Hall. Cambridge.

Jan. 27.—NORTH THAMES G.C.C.: Gas Industry House, 2.30 p.m., followed by showing of North Thames Gas Board's latest films in the Gas Council's new cinema.

Feb. 1.—LONDON AND SOUTHERN SECTION, I.G.E.: 'Atmospheric Pollution,' discussion led by a team arranged by Dr. G. E. Foxwell, 17, Grosvenor Crescent, S.W.1, 2.40 p.m.

Feb. 1.—SOUTH EASTERN G.C.C.: Caxton Hall, Westminster. 11 a.m.

Feb. 1.—LONDON AND SOUTHERN SECTION, I.G.E.: Postponed discussion on 'Atmospheric Polution,' introduced by Dr. G. E. Foxwell; Bishop Partridge Hall, Church House, Westminster (entrance in Great Smith Street), 2.40 p.m.

Feb. 2.—MANCHESTER JUNIORS: Visit to English Steel Corporation, North Street Works. 'Use of Fundamental Data in Gasworks Plant Design,' R. Pollard.

Feb. 4.—LONDON JUNIORS: 'Burner Design,' J. Prigg. 178, Edgware Road, London, W.2. 6.30 p.m.

Feb. 8.—MIDLAND JUNIORS 'Some Functions of a Coal Test Works,' G. E. Brooke. Birmingham.

Feb. 9.—YORKSHIRE JUNIORS: Visit to Stoves, Ltd., Rainhill.

Feb. 11.—SCOTTISH JUNIORS (WESTERN): 'Ubique,' F. D. Southwell. 522, Sauchiehall Street, Glasgow, C.2, 6 p.m.

DEVELOPMENTS IN THE FRENCH GAS INDUSTRY

Abstracts from recent issues of the Journal des Usines à Gaz

THE Annual Report of Gaz de France for the year 1953 shows a gross increase in gas sales of 65 mill. cu.m. (say 2,296 mill. cu.ft.) or 2.4% over the figures for 1952. It would have been at least 50 mill. cu.m. more in comparable conditions of temperature and social climate. The total sales in 1953 of 2,795 mill. cu.m. (98,685 mill. cu.ft.) includes 1,874 mill. cu.ft. for domestic uses, the highest figure ever attained in France. Tariffs, fixed as a function of mean economic conditions of the third quarter of 1951, have not varied except in the case of some undertakings in which modernization of installations has permitted a reduction in price.

The quantity of coke sold was slightly less and at a somewhat lower price than in 1952. To avoid accumulation of stocks, coke production has been reduced by an increased use of coke with petroleum products in the manufacture of gas. The quantity of coal used was reduced from 4,991,000 tonnes in 1952 to 4,679,000 tonnes, while petroleum products used increased from 53,338 tonnes to 88,139 tonnes. Production per man employed in gas manufacture increased from 152,000 to 162,000 cu.m.

As last year, the Report notes not only a decrease in the number of young engineers seeking a career in the gas industry but difficulties in the recruitment of good qualified artisans. From the financial point of view the net surplus shows a small improvement.

Cooling Water from Gasholder Tanks

The gasworks of Loos, with a daily capacity of about 75,000 cu.m. (2,650,000 cu.ft.) was confronted with a problem in the supply of water for use in condensers. Town water was expensive and insufficient, canal and other natural sources were so far away as to make connections expensive; boring was also estimated to be costly as well as doubtfully sufficient. It was decided to circulate the water contained in the above-ground steel tanks of the two gasholders, one of 50,000 cu.m. (1,760,000 cu.ft.) capacity, the other half that capacity. The details of connections and the carrying out of the necessary work are fully described.

A test over nearly 24 hours showed that the temperature of gas was reduced through the condensers from 74° to 17°C. with a rise in temperature of the water from 9.7° to 63° when passing 43,013 cu.m. (1,518,000 cu.ft.) of gas with an energy consumption for pumping of 1.09 watt-hours per cu.m., a figure which attained 1.46 taking the average over the year 1951. The cost showed that the installation was paid for in savings of town water after about two years service. Rain water was more than sufficient to make up any loss of water. It is thought that some simple treatment might be necessary to keep the water in the tanks non-corrosive.

Testing Transmission Mains

Services du Gaz de France have elaborated a precise technique which is successful in detecting leakages, even quite small, in transmission mains which often operate under considerable pressure. Official regulations prescribe tests both during laying and after completion. The problem today is to harmonize these two series of tests in order to reduce cost. Its solution is not yet found. M. P. Grené, former Chief of Transmission Services of Gaz de France, sets out the several tests and suggests how they might be connected with one another.

His conclusions, briefly, are that, while the quantitative test for tightness is that which gives the best indication of the final condition of the pipeline, it presents certain difficulties which are increased by the requirements of the decrees relative to security. It indicates leakage but it does not provide the means of locating it. The decree requires this test to be repeated after the pneumatic test when each compression plant is placed in position and even after each pneumatic test unless they can be run successively. From the point of view of the contractor it may be asked whether these tests might not be run together. It is also shown that a qualitative test for tightness can be made only when the passage of gas is stopped. If the pressure test is recommenced several times in the course of operation, it is practically impossible to follow this, once the main is in service, with a quantitative test.

M. Grené considers several methods which have been proposed for locating the point of leakage. None seems to be rapid and certain. The best combination seems to be an approximation by loading the gas with an odorant followed by a more precise location by means of the portable electronic detector. The method is long and costly and some relaxation in the regulations seems to be called for.

Safety in Electrical Installations in Gasworks

Details are given of safety regulations issued by Gaz de France, in order that gasworks may comply with decrees relative to the protection of workers in establishments where electricity is in use. Gases are classified in four groups similar to those in British Standards, Group III covering 'Town gas and coke oven gas containing less than 60% H_2.'

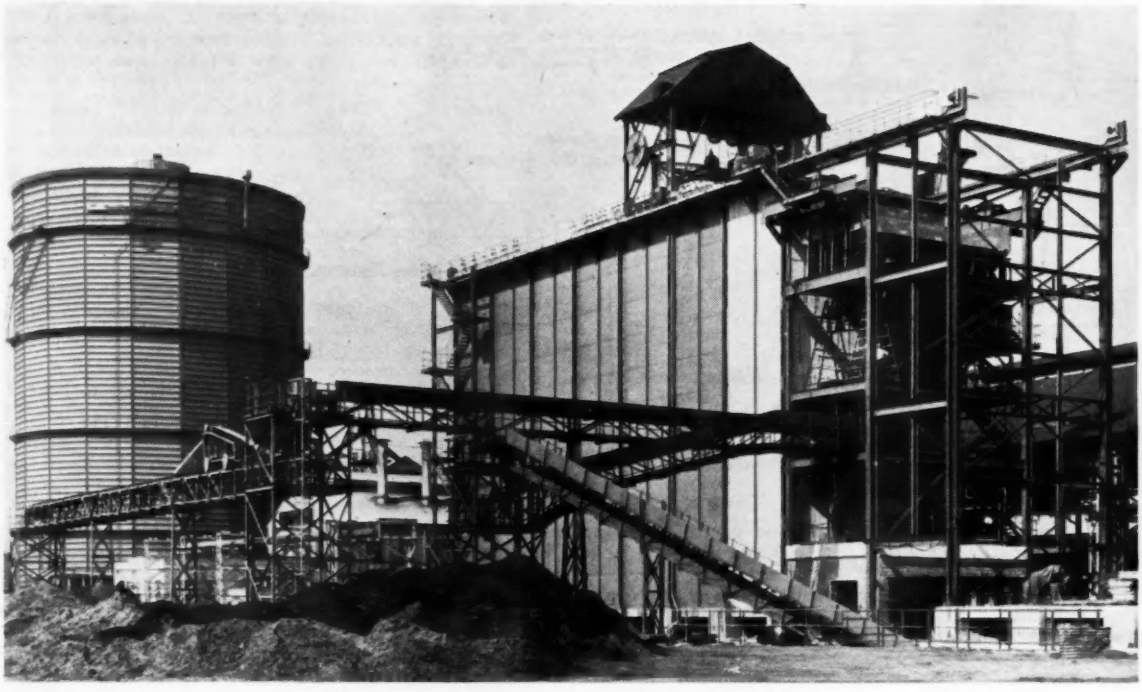
Tower Purifiers

Three new installations of tower purifiers at coke ovens in the coalfields of the North and the Pas-de-Calais are described in some detail by M. Marcel Malherbe, Director of Carbonization and Gas in this region. The installation will consist of three units each capable of purifying 350,000 cu.m. (12,360,000 cu.ft.) of gas per 24 hours. One unit is now installed. It consists of four purifying towers, diameter 6.8 m., height 16.1 m. (23.3 ft. by 52.8 ft.), each containing 12 octagonal trays with two layers of purifying material spread over wooden hurdles, one stocking tower for 12 trays prepared in advance with new material, also one stocking tower for 12 trays of used material coming from one purifier tower. The gas is distributed in the four towers by a system of collectors equipped with three hydraulic valves, in the form of a U for each tower, permitting putting into service or isolation. It is possible to practise the working called "circular," or backward working, but inversion of flow in the towers is not considered necessary. Revivification *in situ* is controlled by a Roots compressor. To avoid excessive temperature in the first tower air may be injected into the second or third tower, the quantity being controlled by a rotameter. Humidity (and temperature of the gas in winter) is controlled by the injection of low pressure steam into the gas at the inlet to each tower. To obviate freezing of the hydraulic valves these are heated by steam injection with the alternative of electric resistances placed in the interior of the valves. Handling, storing, mixing and renovation of the purifying material is carried out in a building placed in tandem with the lines of towers. These operations are fully mechanized with conveyors and reclaiming crane and grab.

This installation, which went into service in September, 1951, with that of the coke ovens of La Silardière in the Loire coalfield, are the two biggest sets of tower purifiers in service in France, important both from the points of view of capacity and handling and preparation of the purifying material.

At Vendin there are four towers each 4.40 m. in diameter by 11.90 m. high (14.4 ft. by 36.4 ft.) placed in a square,

(*Concluded on p. 104*)



General view of the tower purifiers, Car House works.

*Mechanical Handling of Oxide in Tower Purifiers**

by C. E. Mills, M.Inst.Gas E.†

In its struggle for greater productivity the gas industry has a very difficult problem to solve. Materials and labour are expensive and often difficult to obtain; yet, if we are to survive as an industry, we must be able to compete with alternative sources of heat.

The unknown genius who invented the wheel started the practice of mechanical handling, but initially this did no more than ease the labour of men and animals, and only during the last hundred years has the application of power to the wheel made possible the industrial revolution and its consequences. Since labour is no longer cheap and plentiful, serious consideration must be given to the installation of mechanical handling to overcome these shortcomings. Our problem, therefore, becomes that of increasing productivity by mechanization and by the more effective use of manpower. In this short paper an attempt has been made to consider the advantages of mechanically handling the materials used in the gas purification process.

Mechanical handling plants for oxide only existed on a few works before the first war; several others, confined chiefly to the larger works, followed between 1920 and 1930 and consisted either of cranes, skips, conveyor systems and elevators or a combination of these. Overhead purifiers, with or without revivifying floors, were introduced about this period and gained early preference on works where there was a shortage of ground space.

The complete mechanization of oxide handling, which the size of tower purifiers justifies, is now possible, and in such installations new oxide can be charged into the system and retained therein until it is fully spent. The capital cost of such installations, however, is probably only justified where not less than 8 mill. cu.ft. of gas per day is purified.

In the Sheffield and Rotherham Division, purifier installations varying from 20,000 cu.ft. of gas per day to 24 mill. cu.ft. of gas per day are operated, and it is the plant used for mechanically handling the oxide in two of the larger installations which is discussed.

Thyssen-Lenze Tower Purifiers—Neepsend Works, Sheffield

This, the more familiar type of tower purifier installation, consists of twelve working towers with a stocking frame, a stocking tower and the oxide handling plant. Each working tower is 22 ft. 4½ in. diameter, 61 ft. high, and holds 14 octagonal trays, each tray holding approximately 25 tons of oxide in two layers. Above the towers, carried on a separate structure, is a 60-ton capacity overhead travelling crane to handle the trays and covers.

(1) *Emptying and Recharging a Tower Purifier*

The tower to be emptied is purged with inert gas and the cover removed. The fourteen trays are then transferred to the stocking tower, which is sealed and purged. The empty tower is then refilled with the trays previously prepared in

* From a paper presented to the Yorkshire Junior Gas Association on December 11

† Acting Divisional Engineer, Sheffield and Rotherham Division, East Midlands Gas Board.

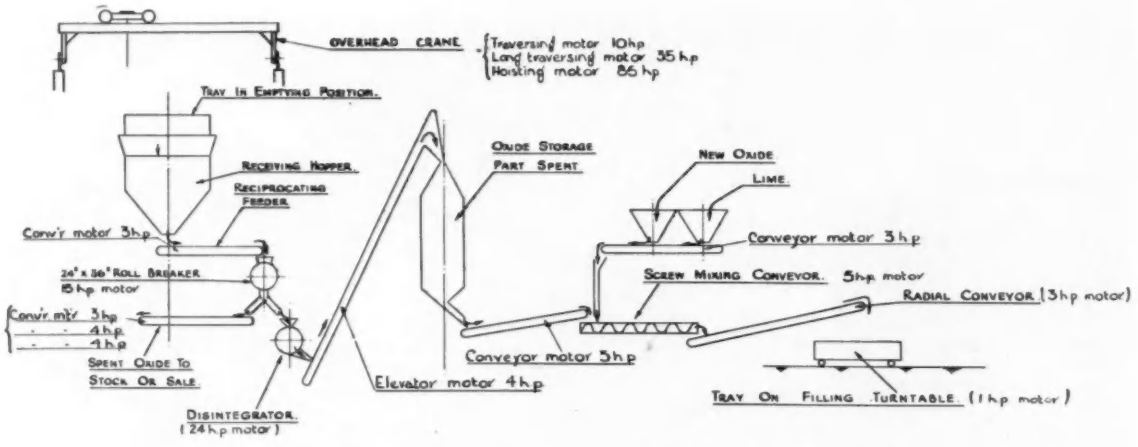


Fig. 1. Diagrammatic arrangement of oxide handling plant, Neepsend works.

the stocking frame. On completion, the cover is replaced and the tower purged first with inert gas and then with make gas before it is put back into service.

The average times taken for these operations, employing three men, are:

Purging	2½ hours
Removing cover and 14 trays	3½ „
Returning 14 trays and replacing cover ...	4 „
Purging	2½ „
Total	12½ „

(2) *Oxide Preparation and Handling*

As indicated in Fig. 1, a tray, transferred from the stocking tower, is placed over the receiving hopper; the two discharge plugs are then withdrawn by the crane and discharging into the hopper proceeds. Electric spaders, with steel tools, are used to break out the material, which falls to the hopper below.

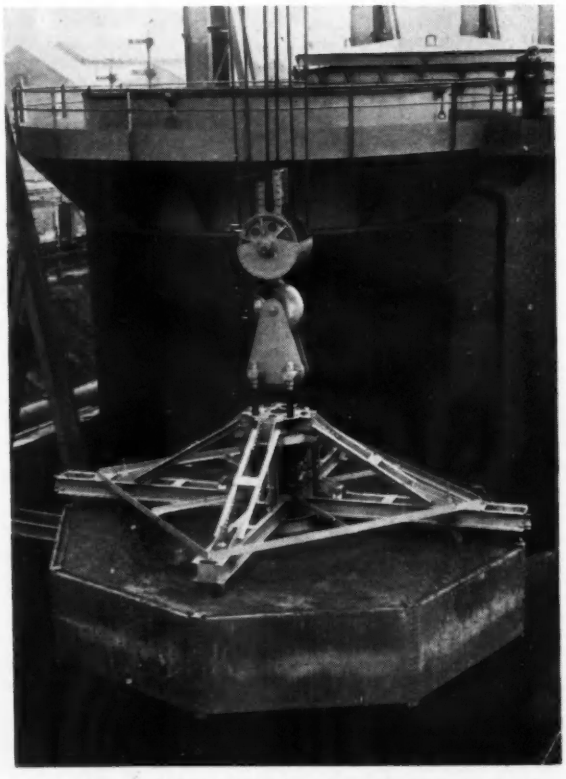


Fig. 2. Handling of oxide basket at Neepsend tower purifiers.

(*a*) Emptying a tray containing part-spent oxide

This material is retained in the system. From the hopper it is fed by the reciprocating tray feeder into the roll breaker where it is reduced to 2 in. cube, passed through the disintegrator and elevated to the 75-ton capacity storage hopper.

(*b*) Emptying a tray containing spent oxide

The operations up to the roll breaker are the same as previously described for part-spent material. After the breaker, however, the oxide passes by belt conveyors to ground stock or to a vehicle-loading chute.

(*c*) Filling a tray with part-spent oxide

The part-spent material is conveyed from the 75-ton capacity storage hopper to a screw mixing conveyor, where the moisture is restored with an atomising spray, and then to the radial conveyor, whence it is discharged to a tray. The tray is carried on a power-operated turntable and can be completely filled by the radial traverse-conveyor.

(*d*) Filling a tray with new oxide

New and part-spent materials are brought to the screw conveyor for mixing, the new material being introduced into the system by the L.H.1 loader (½ cu.yd. capacity) from the adjacent stock.

Lime can also be introduced by the same method as new oxide. Thus, mixtures of new and part-spent material or part-spent and lime can be handled in the system.

The labour force required for operating this system, which is rated at 20 tons per hour, is:

Emptying tray	4 men
Conveyors	1 man
Crane	1 man

This labour force can empty and recharge at least two trays in an eight-hour working day (Fig. 2).

Balfour-Lecocq Towers—Car House Works, Rotherham

The section of this installation at work consists of five working towers, together with stocking frame, stocking tower and oxide handling plant. The remaining five working towers are under construction. Each tower is 16 ft. long, 30 ft. wide, 65 ft. high, and holds 18 trays, which contain 16-17 tons of oxide each in one layer approximately 2 ft. 3 in. deep.

Along the top of the installation and carried on the tower structure is a 35-ton overhead travelling crane for handling the covers and trays.

(1) *Emptying and refilling a Tower Purifier*

After purging with inert gas, the cover is removed. The 18 trays are then transferred to the stocking tower, which is sealed and purged with inert gas. The tower is then recharged with previously filled trays held in the stocking frame. After

replacing the cover, the tower is purged from air to coal gas via inert gas and put back into the purification stream.

The time scheduled for these operations, employing two men, is as follows:

Purging	3 hours
Removing cover, fixing handrail, etc. ...	½ ,,
Removing 18 trays	3½ ,,
Returning 18 trays and cover	4 ,,
Purging	4 ,,
Total	15 ,,

(2) *Emptying a Tray*

The trays are so designed that they can be fixed in the tippler, which rotates through an angle of approximately 150°. Experience of this operation is limited and with material of average hardness, if the oxide is loosened round the edge of the tray, the first tip should discharge about 80%. The remainder, lying chiefly in the corners and between the central gasway and the sides, would then have to be loosened for a second tip to empty it completely (Fig. 3).

TABLE I

	Box Purifiers			Tower Purifiers	
	A	B	C	Neepsend	Car House
1. Gas purified 1,000 cu. ft./day	5,500	5,000	2,500	24,000	20,000
2. Weight of oxide in one vessel (tons)	100	120	85	350	300
3. Oxide handled per change (tons)	200	240	170	700	600
4. Total time purifier is out of gas stream during changing (hours) ..	36	30	10	*12.5	*15
5. Number of men required to change a purifier ..	21	16	12	3	2
6. Total man-hours per change	262.5	192	120	37.5	30
7. Man-hours per ton of oxide handled changing a box	1.31	.80	.70	.053	.05
8. Man-hours per ton:					
(a) Disintegration ..	.64	.7	.75	—	—
(b) Move to elevator ..	—	.2	1.65	—	—
(c) Elevating to overhead floor and stocking	—	—		—	—
Total	.64	.90	2.4	—	—
9. Man-hours per ton emptying and refilling trays	—	—	—	.96	.97
10. Total man/hour/ton changing and preparation (7 + 8/9) ..	1.95	1.70*	3.10	1.013	1.02
11. Labour cost/ton oxide handled (pence) ..	74.58	65.02	118.51	38.75	39.01
12. Capital charges/ton oxide handled (pence) ..	*Not available*			40.48	30.66

* These times include the purging operations before and after the vessels are open. Purging is not yet practised on box purifiers.

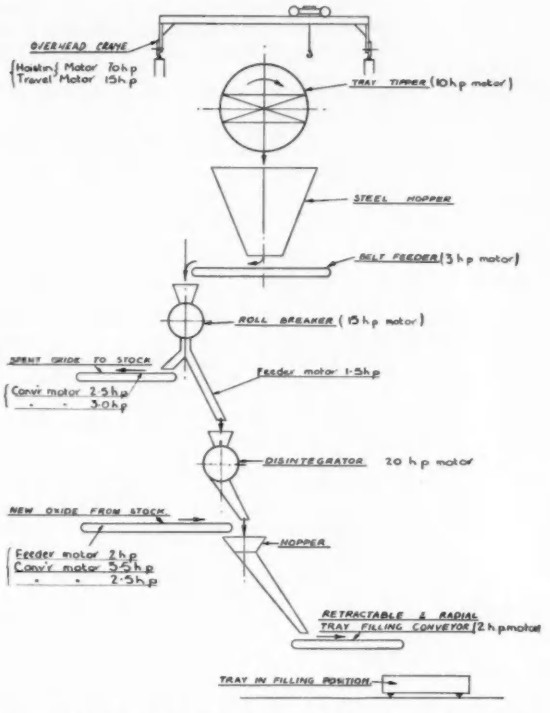


Fig 4. Diagram of oxide handling plant at Car House works.

The oxide tipped from the tray falls into the receiving hopper, above which is a 12 in. square mesh grid to prevent the blockage of the discharge door by excessively large pieces. From the bottom of the hopper, a variable speed belt feeder discharges to a roll breaker, where the oxide is reduced to less than 2 in. cube. Fully spent oxide goes to stock or is loaded for sale. The part-spent is fed via a disintegrator to the rotating and retracting tray-filling conveyor (Fig 4).

The full trays are transferred by the crane to the stocking frame ready for recharging to a working tower.

It must be realized that our experience with this type of

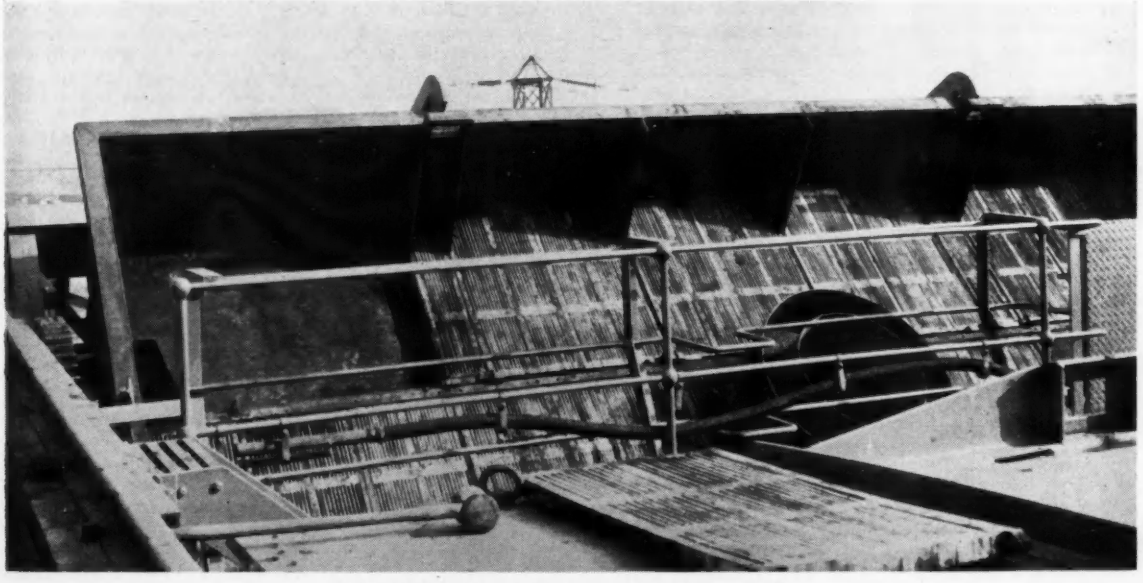


Fig. 3. Oxide tray tipping at Car House works.

tower-purifier installation is very limited, since it is the first of its kind. The handling system has much to commend it and four men are able to empty and refill not less than two trays per day.

Comparisons between typical installations of box and tower purifiers are made in Table I.

Works A has ground level purifiers which consist of five boxes, each 45 ft. long by 27 ft. wide by 6 ft. deep and standing 4 ft. above the surrounding yard level. Each box has six covers and is charged with approximately 100 tons of oxide in three layers. The covers are handled by manually-operated travelling cranes.

Works B has overhead boxes with elevator and conveyor system for filling. This installation comprises two streams, each of six boxes and each box is 40 ft. square by 6 ft. deep, holding approximately 120 tons of oxide in two layers. There are four covers to each box and these are lifted and transported by manually-operated block and tackle mounted on an overhead runway. The installation is designed for bottom discharge with four chutes to each box.

Works C has overhead boxes with overhead floor and vertical elevator. The installation consists of six 40 ft. by 25 ft. by 6 ft. 6 in. deep boxes, each containing approximately 85 tons of oxide in a single layer. Each box has three covers and six discharge chutes in the bottom. The covers are lifted and transported by manually-operated block and tackle from an overhead runway.

Conclusions

A *Box Purifiers*

1. Unless a box can be emptied and refilled in a day, the time it is out of the stream becomes inconveniently long. There is also the possibility of oxide over-heating during the night.
2. To keep the time for emptying and filling a box down to a minimum, a large labour force is essential; this, in the present era of full employment, is very difficult to find and retain.
3. The 'turn-round' time for box purifier installations is shortest where the oxide is stored on an overhead floor ready for recharging.
4. The actual filling time for box purifiers is shortest with an overhead conveyor system, as at works B.
5. It would appear from consideration of *3* and *4* that there is a case to limit the size of box to a capacity of approximately 100 tons. With suitable plant, a box of this size can be emptied and filled during one day.
6. The elevation of oxide for stocking on overhead floors increases the total man hours per ton by approximately 100%. There would therefore appear to be no case for overhead floors, a reliable conveyor system above the boxes only being necessary. Consideration, however, should be given to the use of portable conveyors or small shovels for transporting and stocking oxide on the overhead floors of existing installations.
7. Pneumatic spaders save emptying time and are invaluable where oxide is hard.
8. Hand-feeding of part-spent material to disintegrators is an unpleasant task when compared with mechanical feeding as employed in tower purifier installations and in some larger installations of box purifiers.

B *Tower Purifiers*

1. In tower-purifier installations, approximately between three and four times the weight of oxide can be changed in the same time as in box purifiers.
2. Tray filling is proceeding at the same time as tray emptying and thus oxide preparation becomes a continuous process.
3. Since tower-purifier oxide-handling plants are located in the 'open air,' flameproof Group III conditions do not apply to electrical equipment; consequently, electric spaders can be used to break up oxide in the trays.

   Several types of electric spaders have been tried, but it cannot yet be said that a satisfactory implement has been found. It may be necessary to turn over to compressed air, but it is still felt that the simplicity and economy of electric tools should not be lightly abandoned. The times indicated in item 10 of the table reflect the difficulties in selecting the right tool and the average shown includes the considerable use of hand picks. This must, therefore, be regarded as an interim figure.
4. A smaller labour force is employed regularly under less arduous conditions and the work is thus carried out with greater efficiency.
5. From experience gained on the oxide-handling plants so far installed, there would appear to be a case for the provision of fixed disintegrators at conveyor or elevator boots on box-purifier installations.
6. With a properly designed handling plant it is economic to foul the oxide three or four times, thereby increasing its sulphur content and reducing the amount of new oxide required.
7. In tower-purifier installations, the cost of handling oxide is approximately 2s. per ton less than the best results obtained in box purifiers.

FRENCH GAS INDUSTRY—*Continued from p. 100*

to treat 225,000 cu.m. (about 8 mill. cu.ft.) of gas per 24 hours, arranged for duplication. Each tower contains 16 trays with one layer of oxide. The bottom of the trays is closed with plates placed slightly below the wooden hurdles supporting the material.

The mechanical handling of the purifying material is even more developed than at Drocourt. In addition to the portal crane there is an electrically-operated tipper which reverses the trays to empty them, avoiding all manual labour for digging the materials out of the trays. It is only necessary occasionally to rap the trays to dislodge material adhering to the hurdles. It is proposed to install a system of storage and oxide preparation similar to that at Drocourt.

At Mazingarbe four towers are placed in a square with an electric hammer-head crane in the centre. The towers follow the principle of the conventional purifier box. Each is 6 m. diameter by 5.60 m. high (19.7 ft. by 18.4 ft.) each with eight layers of purifying material in wooden hurdles. The towers are placed on a concrete platform 4.85 m. (15.7 ft.) above ground level. The arm of the crane carries a four tonne winch for handling the top covers and a one tonne winch for handling oxide in skips. Used material is discharged direct into wagons running on a track under the towers. The concrete platform at the base of the towers is extended to form cover for the storage of purifying materials. Operating valves and other equipment are also housed under the platform. The installation, which has just come into service, is designed to purify 120,000 cu.m. (4,200,000 cu.ft.) per day.

Use of Coke in Automatic Boilers for Central Heating

M. Marcel Bernard, Chief Engineer to Gaz de France, describes two boilers of this type, the Dutch 'Amaf-Emma,' which was described in detail in the issue of September, 1953, and the Baillon which is described in detail in the issue of October, 1954. Each of these boilers will deal with comparatively large coke. M. Bernard remarks that for some years the proportion of coke above 30 mm. in that available for sale by Gaz de France has grown from 65% to 75%. The problem is in undertakings producing important quantities of dust, 0.12 mm. It is difficult to screen out the 8-12 mm. size particularly if the coke is water-quenched. In coke ovens up to 3% dust by weight of coal carbonized can be returned to the charge. The combustion or briquetting of the fines, 0-3 mm., remains an unsolved problem. In the meantime the use of the larger grades of coke in automatic boilers is of interest to Gaz de France, and particularly in the two boilers here referred to.

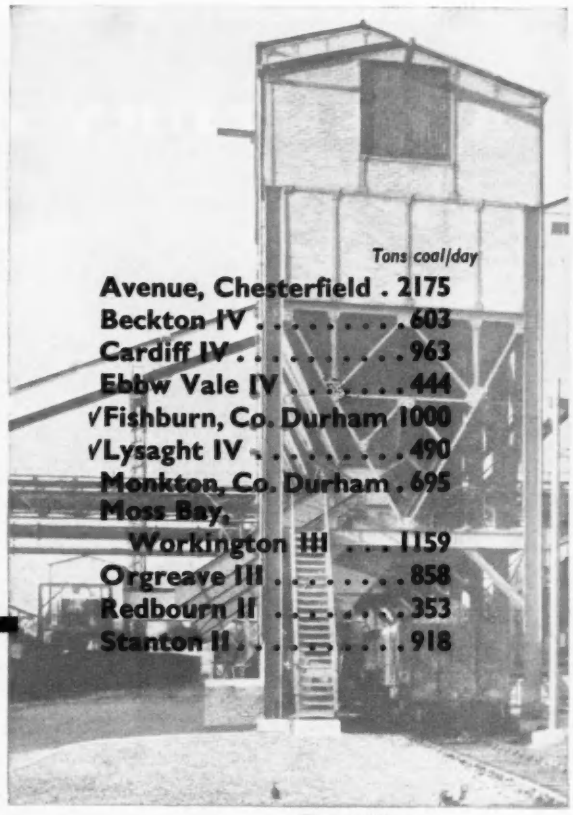
Natural Gas at (Franceville) Tunis

Natural gas from the Djebel-Abderrahmane, in the Cap Bon peninsula, Tunis, is being piped to the gasworks at Franceville. Here it is cracked in Glover-West vertical retorts, fired by Marischka producers using small coke. The retorts are fed with coke, 30-40 mm., at the rate of about 80 kg. per day, and the production of gas in four retorts at 4,500 cal. (470 B.Th.U. per cu.ft.) from natural gas at 12,000 cal. (1,250 B.Th.U. per cu.ft.) is of the order of 9,000 cu.ft. (318,000 cu.ft.) per day. It is intended eventually to crack the natural gas (or heavy oil as auxiliary) in an ONIA-GEGI plant which is already in fabrication.

W-D in 1954 were "on site" building

11 NEW COKING PLANTS

26 NEW GASMAKING PLANTS



	Tons coal/day
Avenue, Chesterfield	2175
Beckton IV	603
Cardiff IV	963
Ebbw Vale IV	444
✓Fishburn, Co. Durham	1000
✓Lysaght IV	490
Monkton, Co. Durham	695
Moss Bay, Workington III	1159
Orgreave III	858
Redbourn II	353
Stanton II	918

	Tons coal/day
Aberdeen V	175
✓Boston	96
✓Brighton III	406
Christchurch, New Zealand	150
✓Croydon IV	270
✓Derby II	380
✓Derby III	380
Dover	341
East Cowes	245
✓Edinburgh IV	259
Edinburgh V	259
Exeter	377
Gainsborough III	18
Glasgow Provan II	436
Glasgow Tradeston II	179
Grimsby VI	80
Irvine III	18
✓Jersey	190
✓Lincoln IV	138
Rotherham	617
✓Smethwick III	205
Solihull III	50
Tingley II	511
✓Tottenham V	93
Walsall II	821

Kensal Green Complete Gasification Plant.

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The figures following the contract names denote the number of W-D installations at this Works.

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*Fuel—Its Availability and Efficient Use**

By K. T. SPENCER

Chief Scientist, Ministry of Fuel and Power.

ALL industrial production depends decisively on fuel and power. British industry grew up and became a leading influence in the world in an age of cheap and abundant coal. So far as we in this country are concerned, that cheapness and that abundance have gone for ever. Atomic energy may falsify this prophecy, and it is to be hoped that it will. But as yet we cannot count on it doing so. In any event many years must pass before atomic energy could replace coal as our main source of energy. We must face up to a continuing fuel shortage during those years; we must identify its implications and we must shape our plans and actions accordingly.

Before considering some of these implications, I want to drive home the facts about the present fuel and power situation and how that situation has come about during the last generation or two. The facts are well-documented, but even now they are not widely enough realized.

Britain's first recorded fuel crisis occurred in the 16th century. Although coal had been mined in small quantities since at least the 14th century and some power was obtained from windmills and water-wheels, the general fuel at this time was still wood.

According to G. M. Trevelyan (Social History of England), the 16th century was notable for a great expansion of mining of all kinds. In the smelting of the ores, particularly iron ores, vast quantities of wood and charcoal were burned and the timber resources of the country were drained away. Household heating and cooking depended normally on wood, as did the manufacturing industries, and, as local supplies became exhausted, we are told that many a cottager had a cold hearth and a bread-and-cheese diet and the output of the manufacturers was sorely restricted. Some works, including those of the new glass industry, had to move around and follow the woods. It was during the period 1550 to 1600 that coal started to come into much greater use to supply the deficiencies, though this was limited to localities near to the pits or near to navigable water. In 1578 it was said that 'brewers, dyers, hat-makers and others have long since altered their furnaces and fiery places and turned the same to the use and burning of sea-coal'. A premature and unsuccessful attempt was also made at this time to smelt iron with coal.

During the period 1750-1800, in return for manufactured goods, the North American colonies sent us timber and pig iron. Timber and iron were also imported from the Scandinavian and Baltic countries because eighteenth century England, having exhausted its natural forests, was short of timber for ship-building, house-building and fuel. Although coal was now largely filling the fuel deficiency for domestic heating and many manufactures, it was only beginning to be applied on a large scale to the smelting of iron. 'And so, in spite of England's potential wealth in iron ore, much iron was imported from lands which still had virgin forests to burn'.

The development of the industrial revolution is familiar history. It is sufficiently well known that, with the application of coke to the smelting of iron, and the rapid expansion of the iron industry and industrial activity generally which followed, there was a sharp rise in the consumption of coal, reaching a pre-war maximum in this country of 200 mill. tons in 1916. At the same time, up to the commencement of World War I, coal was exported in ever-increasing quantities, reaching a maximum of 98 mill. tons in 1913.

The effect of industrialization was gradually to alter the entire economy of the country from self-sufficiency to extensive reliance on imported food and raw materials. At the present time, 50% of our food is obtained from abroad and we have come to depend more and more on the importation of raw materials, not only to satisfy the needs of a much bigger population, but also because many native resources, for example lead, tin, copper and timber have been virtually exhausted.

Manufactured goods have therefore to be exported in ever-increasing quantity, in the face of growing competition from the more recently industrialized countries, particularly the U.S.A., whose manufacturing capacity and resources of raw materials and energy are vastly greater than our own.

In order to survive at all, the flow of manufactured goods has to be maintained and increased and we have only one indigenous resource with which to provide the energy required by the manufacturing industries. But coal production has not kept pace with the growing needs of our factories. Thus we are again approaching a situation similar to that of the 16th century.

Trends in Energy Consumption

Apart from the fluctuations caused by two world wars, the total consumption of energy (coal and its equivalent in petroleum and hydro-electricity) per head of population in Great Britain has remained relatively static for 50 years or more. Coal consumption has varied around four tons per head and, in recent years, this has been supplemented to some extent by imported petroleum, the consumption of which in 1953 had risen to the equivalent of 0.5 tons of coal per head. Hydro-electricity, although of great value to the localities in which it is generated, does not significantly add to the country's energy resources, since it amounts at present to the equivalent of only one mill. tons of coal per annum, or 0.22 tons per head. Even if all potential hydro-electric power resources were fully developed they would represent the equivalent of only 4 mill. tons of coal per annum. The marginal energy resources, which are at present being investigated and developed—*i.e.*, peat, wind power, methane from mines and, possibly, natural gas, cannot appreciably alter the general picture. This implies that we depend on coal and, unless natural gas is found in large quantities, we will continue to depend on it.

Although our total use of energy has not greatly changed over many years, the pattern of its utilization has substantially altered. As industrialization has proceeded apace, the coal requirements of industry have steadily grown and, with coal production declining, these requirements have been met so far by increasing efficiency of utilization, by reducing exports and by increasing the use of oil.

Utilization of Energy in the U.S.A.

The trend in the utilization of energy in the U.S.A. has been strikingly different from that in the United Kingdom. Apart from wood, for which the facts are not readily available, energy consumption in the U.S.A. in terms of coal per head was in 1860 only 7% of that in the United Kingdom. By 1950 the corresponding figure had risen to 168% and today it is higher, largely as a result of the rapid growth of the natural gas industry, which in 1953 supplied 26% of all the energy requirements of the U.S.A. A high rate of energy consumption is the main factor in the rapid emergence of the U.S.A. as the leading industrial nation and its high standard of living. Whether this is in the long-term interests of the U.S.A. is open to doubt, but it determines the level of industrial production with which we must compete.

Among the European countries, Great Britain is still the largest consumer of coal per head. In the case of Western Germany, which may be quoted for comparison, energy con-

* From a paper presented to the D.S.I.R. Conference on Research and Industrial Productivity, 1954.

sumption in 1952 was equivalent to just under three tons of coal per head, or 68% of the United Kingdom figure.

Energy Requirements in the Immediate Future

Although the coal reserves of Great Britain are believed to be enough for at least the next 200 years, coal is no longer being produced in the quantities needed. The National Coal Board, in drawing up its plan for reconstruction of the industry, originally estimated that by 1965 the total inland demand for coal would be 205-215 mill. tons a year and the export demand 25-35 mill. tons. Therefore the plan aimed to increase total production to 240 mill. tons in 1960-65. Later the Ridley Committee made an independent estimate of probable coal requirements. On the basis of past trends in all branches of coal utilization and making allowance for improved efficiency in utilization, the Committee estimated that in the period 1959-63 the inland demand for coal would probably be some 230 mill. tons per annum, roughly 20 mill. tons greater than the National Coal Board figure. In the light of the Ridley Committee's estimate the coal production plan was revised, and the aim is now to produce 260 mill. tons annually in the period 1961-65.

In the last three years, despite continued restrictions on domestic coal, inland consumption of coal has been running at more than 200 mill. tons. In the current year 4 mill. tons are to be imported as a precautionary measure, since it is now estimated that inland coal requirements in 1954 will be 7 mill. tons greater than in 1953. It is conceivable that within the next decade the gap between supply and demand could increase to the order of 20 mill. tons per annum. Electricity generated from nuclear energy may eventually come to the rescue, but there is no possibility that aid from this source can materialize for several years. Sir John Cockcroft has said: 'I envisage a development period of eight years, during which we shall have built and operated our Mark I power stations for five or six years and designed and built improved Mark II stations and possibly even a Mark III of a different type. We should then be in a position to build nuclear power units on a scale adequate to do the job of 20 mill. tons of coal a year, and I think this could easily be achieved between 1965 and 1970—perhaps earlier if the need is great.'

Filling the Gap

The gap that will exist between coal supplies and requirements for at least the next ten years has been plainly shown. How is it to be filled? There are three possible ways:—

Increasing the production in the mining industry.
Increasing the importation of fuel, principally petroleum.
Increasing the efficiency of energy utilization.

Increasing Production in the Mining Industry

The prospects for greatly increased production from the mining industry are not encouraging. In 1945 the Reid Committee made drastic recommendations for the mechanization of the industry, which have formed the basis of the National Coal Board's programme of reconstruction. The recommendations included the maximum employment of coal-cutting and loading machinery, the replacement of rope haulage by locomotive and conveyor haulage and the increased use of electricity underground. Heavy capital expenditure has already been incurred in putting these recommendations into effect. Since 1947 the percentage of coal mechanically cut has increased from 75% to 82%; the percentage mechanically conveyed from 75% to 88%; the percentage power-loaded from 2.1% to 6.4%. The horse-power of electric motors installed in mines has risen in the same time from 2.7 mill. to 3.4 mill. and the number of locomotives underground from 185 to 468. In spite of these efforts to modernize and mechanize the mining industry, an increase in production sufficient to solve our difficulties has not yet taken place.

Partly for reasons outside the control of the National Coal Board and partly as a direct result of mechanization, the quality of coal produced has declined and is likely to continue to do so. This applies to coking properties, size, ash content, and sulphur content. The main reason for the deterioration is that, in the past, the best seams were preferentially mined and the coal has now to be obtained from thinner and dirtier seams. It is therefore unrealistic to count on coal production increasing sufficiently to cover all our requirements.

Increasing Importation of Fuel, Principally Petroleum

It is already realized that, short of finding natural gas, this is the easiest and only immediate solution to the fuel shortage. It was stated by the Minister of Fuel and Power in the House of Commons on July 9, 1954: 'Between the present time and the time when massive contributions are made by nuclear power there will be a period when it will be extremely valuable to this country to have some other supplement to our fuel and power resources. . . . There is only one source capable of making a sufficiently massive contribution and that is oil.' It has since been announced that, in addition to the new power station which is being built at Marchwood, which would have a coal consumption of 600,000 to one mill. tons of coal per annum, seven other of its new power stations are to be provided by the British Electricity Authority with dual-firing equipment capable of burning either coal or oil; Marchwood will begin to burn oil in the autumn of 1955.

The gas industry also is exploring methods of making gas without the use of coal. In addition to prospecting for natural gas, the industry has been developing processes for catalytic cracking of heavy fuel oil. Each gas board has decided to install at least one of these plants, which will represent a saving of about 400,000 tons of coal a year. With regard to plant for the total gasification of coal the Chairman of the Gas Council has indicated that, in view of existing uncertainty about the coal supply position, the industry attaches less importance to this development than to the pursuit of means for making gas which do not require coal.

The steel industry started conversion of certain of its plant to oil-burning in 1946 and is already the United Kingdom's largest single consumer of heavy fuel oil.

Increasing the Efficiency of Fuel Utilization

From all points of view, this is the most sensible method for filling the gap. The problem of efficiency in the utilization of energy is not a new one. In 1871 a Commission appointed 'To enquire into the several matters relating to coal in the United Kingdom' presented its report. One of its sub-committees, the Committee on Waste in Combustion, had been required 'to enquire whether there is reason to believe that coal is wasted by carelessness or neglect of proper appliances for its economical combustion.' Many of the findings of this Committee are worth quoting. Its general conclusion was that 'without doubt coal is wasted by carelessness and neglect in large quantities . . . . but, for some time past, in our manufactures, there have been constant and persevering efforts to economize coal by the application of improved appliances for its consumption.' With regard to the real practical value of coal as a source of power in steam engines, the Committee found that, on the average, 'not more than one-thirtieth of the whole theoretical value of the coal is at present realized in power.'

After expanding on the luxury of the open fire 'which is utterly wrong in principle,' the report refers to the findings of an even earlier commission which reported in 1856 on the best methods of heating and ventilating dwelling houses and barracks. 'We have, however, the striking fact, showing the immovability of the public, that during the 15 years which have elapsed since this commission began its labours and reported thereon, no economical result has been obtained.'

Undoubtedly, in 1870 coal was consistently wasted in large quantities. But the 'constant and persevering efforts to economize coal' had begun and that they have been effective is evidenced by the rapid rise in production of manufactured goods since then, which has been accomplished without a corresponding advance in the total consumption of coal by industry.

Several industries have undoubtedly made conspicuous progress in fuel efficiency in recent years. It is nevertheless true that, in some branches of coal combustion or heat utilization, little progress has been made since 1871, giving justification for Sir Ben Lockspeiser's comment that we are the champion fuel wasters of Europe.

Wastage of Coal

For the purpose of studying how coal is wasted, it is convenient to consider the subject under five broad headings: The railways, the domestic fire, the collieries, the iron and steel industry, and industry in general. As suppliers of refined forms of energy from coal, the electricity and gas industries are of necessity conscious of their own interests in using coal to its maximum advantage. In the case of the gas industry, a fair assessment of its progress has not been attempted, since no account has been taken of coke and by-products.

The railways consume roughly 14 mill. tons of coal a year, almost 13 mill. in the form of good quality, large coal. In

1953, nearly a quarter of all the large coal available went to the railways. But the efficiency of coal utilization in locomotives is extremely low, and it has shown little improvement over 100 years. By 1920 maximum overall locomotive thermal efficiency had reached about 7% to 8%. At present certain British Railways locomotives can achieve 10% to 12%, under optimum speed and power conditions. These figures relate to maximum efficiency achieved under special test conditions and are in no sense a measure of the practical efficiency achieved in everyday service. A modern express locomotive on daily long distance runs achieves an average overall efficiency between 6% and 7%; a shunting engine averages under 3%. Overall steam locomotive efficiency on British Railways is probably under 5% and there seems no prospect of any substantial improvement in the efficiency of the coal-burning locomotive in its present form. Modern railways electrification, however, can convert the energy in the coal to useful work at the train with an overall average efficiency of 19%. This represents a difference between something over 3½ lb. of good coal per h.p. hour on a steam railway system and 1 lb. of poor coal per h.p. hour on an electric system. The leading authorities in railway engineering and various official enquiries have consistently advocated railway electrification. If it should prove practicable to electrify the whole system, some 13 mill. tons of large coal per annum would be saved at the cost of an increased consumption at power stations of some 5 mill. tons of poor quality coal.

The wastefulness of the open domestic grate is already too well known to need discussion. Apart from its wastefulness, the problem of the open fire will have to be faced if air pollution is to be got under control. That 'immovability of the public' has persisted since the problem was recognized in 1856.

The Collieries

About 10 mill. tons of coal a year are burned to raise steam at the pithead. The existing boiler plant is mainly obsolete and inefficient and in 1951, out of 3,900 shell boilers in use at collieries, 3,400 were hand-fired. Steps have since been taken to convert to mechanical stoking the 500 hand-fired boilers most suitable for adaptation. In spite of the general inefficiency of colliery boiler plant it is often necessary to burn good quality coal in it.

In addition to purchasing more electricity from the British Electricity Authority, the aim of the National Coal Board is gradually to replace all inefficient plant and to build colliery power stations which can burn all the low-grade coal produced. In the meantime improvements are confined to the installation of mechanical stokers in place of hand-firing where possible, and the installation of water tube boilers in place of shell boilers. The National Coal Board has instituted its own fuel efficiency organization, which is already achieving results.

Apart from the electricity and gas industries, the iron and steel industry is the largest single user of coal. In addition to the 25.9 mill. tons of coal carbonized in coke ovens in 1953 to provide coke for blast furnaces, the iron and steel industry consumed 7.4 mill. tons of coal, and a further 1 mill. tons of oil. In iron smelting, coal accounts for nearly half the cost of the final product and hence, as in the gas and electricity industries, a large amount of work is being devoted to the problems of fuel economy and heat utilization both by the industry and by the British Iron and Steel Research Association. In addition to blast furnace operation, nearly all processes in the manufacture of steel require large amounts of heat. The industry is also aware of the scope for economy in these operations.

Industry in General

Excluding the iron and steel industry, the general manufacturing industries account for over 75% of all industrial coal consumption, or 36.4 mill. tons in 1953. It is thus obvious that even small economies in this field can produce a large total saving. It is not easy accurately to assess the improvement in steam raising performance in industry over a span of years, since similar types of boilers ought to be compared and allowance made for the advent of mechanical firing and advance in design, with the incorporation of feed-water heaters, air heaters and steam super-heaters.

In his recent Presidential Address to the Institute of Fuel, Dr. Idris Jones quoted the economists' opinion that even by 1965, on current values, every ton of coal should enable us to produce nearly £100 worth of goods and services. At the present time this figure may be put very roughly at £60, obtained by dividing the value of gross national production by total industrial fuel consumption. This means that the average cost of fuel to industry is about 7% of the value of the goods produced. This overall figure has little significance since fuel costs vary enormously between the different industries.

There are all degrees of variation in the values of the goods which can be produced from one ton of coal. But the industries in which the cost of fuel amounts to only a small proportion of the value of the product are not necessarily small consumers of fuel. On the basis of 1948 figures, the coal used by industry can be allocated between the various industries as follows:—

COAL CONSUMED BY INDUSTRY

Industry	% of Total
Iron and steel	22.5
Textiles	14.6
Clay	10.3
Engineering and other metal trades	9.4
Chemicals	8.3
Food and drink	7.2
Paper	6.6
Cement	4.5
Glass	2.3
Laundries	1.9
China and earthenware	1.4
Rubber	1.4
Lime	1.4
Petroleum and tar	8.2
Allied chemical trades	
Salt mines and works	
Other textiles	
Leather	
Miscellaneous	

The textile industry, which is a low-fuel-cost industry, actually consumes nearly 15% of all industrial coal, whereas cement, which is a high-fuel-cost industry, takes only 4.5%. This emphasizes the need for coal saving by all branches of industry.

Any trend in the efficiency of coal utilization by industry can be discovered only by studying each industry separately and trying to compare present performance with past performance. The specific consumptions in a number of industries have been determined by dividing the total quantity of product by the total equivalent coal consumption for the years 1935 and 1948 or 1953. The total equivalent coal consumption includes coal, coke, and oil fuel on an equivalent heat content basis plus purchased electricity in terms of the coal required to generate it. It was not possible to include gas since the figures for 1948 are not reliable and none was available for 1935. The results show that in some industries—*e.g.*, paper and board, bricks and fireclay, cotton, productivity per ton of coal apparently decreased between 1935 and 1948, but that on the whole overall production resulting from the consumption of one ton of coal was slightly greater in 1948 than in 1935. It is impossible to estimate the extent to which changes in production per ton of coal have been influenced by the conflicting tendencies of increased mechanization, which increases energy consumption, and fuel efficiency, which reduces it. But in most cases of increased production, the relative use of fuel has decreased, while, where the 1948 production was less than that in 1935, there is a tendency to an increased relative consumption of fuel. Deterioration in coal quality may have had some effect here.

Owing to the wide variation in every industry between the performances of the different plants and firms, too definite conclusions must not be drawn from average figures in respect of comparisons between today and 20 years ago. Even if firms are grouped under the same process there are a number of subsidiary processes and services which may be carried out under different conditions and to varying extents by the different firms—*e.g.*, sand drying in iron foundries, boxmaking, etc. One firm may even start its manufacturing process at a higher or lower level compared with another in the same industrial group. For many processes coal consumption figures are dependent on size or output of plant. Conclusive figures are best obtained by comparing the specific fuel consumption of individual firms from one period to another and noting the change.

If specific consumption figures for a particular product are to have any meaning, they must be assessed separately for each manufacturing process, for space heating, for lighting and whatever coal usages there are which are not constant through-

out the industrial grouping considered. Furthermore, the size and capacity of plant have to be taken into account and also, in some special cases, the kind of fuel fired. Allowing that these factors have not been taken into account there are still some striking discrepancies between the quantities of goods produced per ton of coal equivalent within individual industries. In the matter of fuel consumption within individual industries there is a wide field for investigation, preferably at the level of separate firms.

A detailed analysis of this kind covering more than 20 breweries has recently been carried out by the British Coal Utilization Research Association. The investigation revealed a variation in fuel consumption of between 3.5 and 12.6 therms per unit of product, the better performances usually being associated with the larger plants. The variation was found to be caused, half by the carrying out of additional processes, and half by variations in the utilization of heat. On the average about one and a half times more fuel was used than was necessary; some works used nearly three times as much. Wastage occurred mainly in boiler houses. As a result of the investigation it has been found possible to suggest methods of improvement. All are simple, and if put into effect are expected to save about 200,000 tons of coal per annum.

The Way to Economy

Much has already been done towards promoting fuel economy in industry. Some of the credit can reasonably be claimed by the Fuel Efficiency Branch of the Ministry of Fuel and Power, whose work in this field is now being expanded and intensified by the National Industrial Fuel Efficiency Service. The endeavours of the British Coal Utilization Research Association have been successfully directed for more than 16 years towards the more efficient use of coal in home and industry. The Fuel Technology Section of the British Iron and Steel Research Association is constantly seeking methods of reducing fuel consumption and utilizing waste heat in that industry. Fuel saving is a primary object of these organizations.

In his Messel Memorial Lecture of 1952, 'The Strategy of Science', Sir Henry Tizard referred to the urgent necessity of making better use of capital resources and scientific manpower, and he drew the analogy of the military commander who never has at his disposal all the reserves he would like but, by strategy, makes the best use of what he has. The fuel front is also of critical importance. There is already a gap in it. Yet some of our reserves are still standing by.

It is to these reserves that attention should be drawn. A wide scope exists for fuel saving; first, by raising the general standard of efficiency of fuel-burning plant and, second, by ensuring that, so long as it is suitable for the job, the most economical machinery or process is in fact being employed. It is not enough to generate energy efficiently in one stage of manufacture merely to dissipate it in a subsequent stage. Each individual case may appear insignificant but the sum of their inefficiency represents a substantial waste of the nation's resources, and a reserve which must be deployed in this emergency.

Role of the Research Associations

A characteristic approach to the problem, and one which has already been applied with success, is to test the performance of plant and processes under conditions of normal operation in different factories producing the same type of goods. On this basis comparisons can be formed, and when sufficient experience has been collected, a reasonable standard of fuel consumption can be defined for the particular operation that should be at least attainable by every firm. It is on the industrial research associations that this task most naturally falls, qualified as they are by their status in industry and by their technical and scientific resources. The work of the British Ceramic Research Association serves well to illustrate this point, inasmuch as fuel consumption can only form a limited part of the interests of the Association. The extensive programme of exhaustive and fully recorded tests on different types of kiln and drier under normal operation conducted by the Association provides a body of information to the industry on the typical performance and fuel consumption of all industrially used pottery firing and drying installations. In addition, guidance has been provided on practical waste heat recovery, efficient steam raising, economical use of electricity, reduction of smoke emission, etc. Its activities have contributed to the greatly improved atmospheric conditions in the potteries and the conversion of many kilns to gas firing is already saving many thousands of tons of coal annually.

The engineer and management of a pottery factory now have criteria readily at hand by which to measure the performance of their own plant and ample information drawn from practical examples to show in which direction fuel economy may be sought. Similar work has been done by other industrial research associations—*e.g.*, laundries and wool, and in an industry of a different kind, by the National Institute of Agricultural Engineering. The field is vast, particularly among those power and process-heat using firms in which the cost of fuel has been of minor importance and in which, therefore, research into fuel economy has not been an item of primary interest. The need for continued research in pure and applied science is not questioned, but it is not likely to lead to quick results. The type of investigation advocated here does not require experimental work, but instead the intelligent analysis of available data. For many industries and operations there must be an enormous amount of material readily at hand. Now that the fuel problem is permanently with us, the contribution that the research associations can make by providing information and guidance of this type for industry has become of immediate importance.

The Role of Industry

The lead that can be given by the research associations must find an active response in industry; the one is complementary to the other; if either fails, both may fail. Nearly all industrial and commercial firms maintain some kind of organization which studies matters such as times and methods, manpower economy, production programmes, sales, etc. Surely such an organization could well embrace within its activities the problem of fuel economy. A function of the research associations would be to correlate the results reported by firms in the same industry, make comparisons, and give advice. It must become an essential feature of good management to take fuel economy under its purview: management must become fuel minded. The bill for fuel may not appear as a weighty item on the balance sheet of many firms, but its narrow money value belies its true importance. If the supply becomes erratic or is not dependable, financial repercussions can be very heavy.

BRITISH PRODUCTIVITY COUNCIL

Mr. Tom Williamson, C.B.E., J.P., General Secretary of the National Union of General and Municipal Workers, concluded his year of office as Chairman at the annual general meeting of the British Productivity Council on December 15, and was succeeded by Sir Ewart Smith, Technical Director of Imperial Chemical Industries, Ltd., who has been Deputy Chairman for the past year. Mr. J. Crawford, J.P., General President of the National Union of Boot and Shoe Operatives, Member of the General Council of the Trades Union Congress and Chairman of the T.U.C. Production Committee, was elected Deputy Chairman.

There are now 96 local productivity committees and associations. In a growing number of instances, committees, once they are well established, convert to local productivity associations to enable them to broaden their basis of membership. Associations have been established in Birmingham, Coventry, Bristol, Slough, St. Albans, and other centres. Details of the work of the committees were given in the recently-published Progress Report for 1953-54. In addition to the Circuit Scheme for inter-factory visits, which has been adopted by the majority of committees, they are promoting film shows, exhibitions, public meetings, brains trusts, study groups and various forms of mutual aid or 'good neighbour' arrangements among groups of firms for the exchange of information and assistance on specialized productivity techniques.

The Council's Work Study Unit, set up to develop a more widespread appreciation of this important technique for raising productivity, has already made visits to local committees and other institutions in all parts of the country, and is heavily booked for months ahead. The Council is also engaged in the preparation of industrial films and pamphlets, and reports on progress in specific industries to support its general educational campaign.

Coal Travel in Continuous Vertical Retorts*

By C. H. LEWIS, M.SC., M.INST.GAS E.†

THIS paper describes seven investigations carried out in four installations of continuous vertical retorts in the North Thames Gas Board area, using radioactive tallies. The method employed was given by the author in a paper to the Institution of Gas Engineers in 1951 (Communication No. 394). Since then, however, more accurate counting equipment has been introduced. The present work was materially assisted by the Woodall-Duckham Construction Co., Ltd., in providing without cost to the Board a full-scale model of a large part of an 82-in. lambently heated retort complete with combustion flues.

It is pointed out that, in the hypothetical case of an ideal monolithic charge having no tendency to swell, travelling down an untapered retort with a constant extraction rate, the charge will travel at a uniform speed independent of the distance travelled down the retort. If the retort be expanded so that the charge is no longer in contact with the walls, the rate of travel will be unchanged provided the charge does not collapse through lack of support. In practice these conditions may be realized in the lower portion of a working retort carbonizing coals of moderate or low swelling power. Below a certain level in the retort, the coke shell forming the outside of the monolith will be sufficiently strong to withstand the lateral forces produced by swelling of the residual coal core, and also sufficiently strong to resist collapse if unsupported by the retort walls. Below this point, the charge will descend at a constant rate determined by the extractor speed and the minor axis width of the monolith. This rate will be the same whether the lower part of the retort be tapered or untapered.

In the upper portion of a practical retort, conditions are very different. Haffner and Weston showed, from their observations on retorts quenched at Nine Elms, that the skin of coke formed on the outside of the charge in the top of the retort was ruptured by the swelling of the core, and, by expanding as it descended into the increasing cross-section developed by the taper of the retort, provided space to accommodate swelling of the coal. Clearly, if at all points the rate of increase of the retort cross-section is equal to the rate of swelling of the coal core, the core travels downwards at the same rate as the coke shell. The shell descends at a rate determined by the extractor speed, and a tally placed in the coal core will therefore travel down the retort at a constant rate. This may be taken as the ideal condition in which the charge is always in contact with the retort wall and in which there is no difference in the apparent rate of travel of the coal core and the coke shell.

If, however, the taper of the retort be excessive, when the coke shell has ruptured, the free space over and above that required to accommodate swelling of the coal core will be filled by the influx of additional coal from above. The coal core at the top of the retort will descend more rapidly than the coke shell, but as the core is eliminated by progressive carbonization the rate of descent of the core will decrease until it is equal to that of the coke shell. A tally located in the coal core will, therefore, travel at a rate that decreases as it descends to the lower levels of the retort.

Conversely, if the rate of taper of the retort be inadequate for the swelling power of the charge, a tally in the coal core will travel at a rate that increases as it approaches the bottom of the retort.

In general, the rate of swelling of the coal core will not be constant, since it depends, *inter alia*, on the rate of heat penetration into the charge, which varies throughout the depth of the retort. Nevertheless, the implication of the shape of the mean rate of descent curves for the two series of experiments at Bow Common, is that the rate of taper in the upper portion of the retort is greater than required to accommodate swelling of the charge.

Swelling of a charge depends not only on the swelling properties of the coal substance. Any normal coal charge has a certain proportion of voids, which varies with the size analysis of the coal, and is related to the bulk density. For a given coal, the lower the bulk density the higher the proportion of voids, and the more free space is available to accommodate swelling within the charge. Thus, a coal of moderate swelling power, when carbonized in the form of closely sized nuts, may swell but little in the retort, whereas mixed sizes of the same coal may, because of the reduced proportion of voids, swell considerably. The relationship between swelling and charge density has for long been of great importance to coke oven designers and operators, but its importance in other forms of carbonizing plant appears to have received little attention.

From the results of the investigation, it is clear that the introduction of continuous minor axis taper has resulted in a great improvement in coal travel. The effect is partly due to the provision made for swelling of the charge in the lower part of the retorts and partly to the reduction in sliding friction between the charge and the retort walls.

The measurements of coal travel, however, suggest that when carbonizing coals of low or moderate swelling power the lower portion of the charge may not be in contact with the retort walls. This appears to be no disadvantage when producing gas at high calorific values, but clearly militates against reduction in calorific value by steaming. When the retorts with continuous minor axis taper were put to work at Bow Common, it was immediately found that the calorific value of the gas produced was higher than with the standard retort. If the view that in this installation there is normally a gap between the retort wall and the lower portion of the charge be correct, the reason for the higher calorific value is at once obvious.

When the continuously tapered retorts were constructed at Bow Common the coals carbonized had a Swelling Number of 7½ to 8, whereas during the experiments on coal travel the Swelling Number for the inland coals was in the range 1½ to 6. The continuous taper is less essential with the lower-swelling coals, but still appears to have advantages when producing gas at high calorific values. The thermal yield of gas is slightly higher than in the standard retort.

Absence of contact between the lower portion of the monolith and the retort wall does not appear to have an adverse effect on coal throughput. This, it is presumed, is because radiation and convection are always the primary methods of heat transmission into the charge in this region, where contact can only occur at very few points. The volume of gas produced by devolatilization of the coke shell in this zone is comparatively small and the hydrocarbon content low, so that overcracking in the free space surrounding the monolith is not serious, while presumably the primary products liberated in the coal core do not readily penetrate the plastic layer and, hence, escape degradation in the bottom of the retort.

The transit times determined for the various coals in the installations so far investigated are inversely proportional to the coal throughputs. Taking first the experiments with inland coals and with mixed Durham coals in the 82 in. retorts at Bow Common, the transit times for No. 2 bench were 10.5 and 13.9 hr. respectively. The average throughput of inland coal was 9.16 tons per retort per day, and the relation between the transit times suggests a figure of 6.9 tons per day for the Durham coal. If the base of the monolith, as suggested, does not fill the cross-section of the retort, the throughput of Durham coal would be approximately 7.44 tons per day. The 82 in. retorts in the new installation at Kensal Green have, by virtue of the major axis taper, a volumetric capacity about 3% less than the retorts at Bow Common, and

* Institution of Gas Engineers. Abstract of Gas Council Research Communication G.C. 19.

† London Research Station, The Gas Council.

the throughput of Durham coal at Kensal Green should, therefore, be about 7.2 tons. This is, in fact, found to agree closely with the optimum throughput for these retorts.

In the 103 in. retorts at Fulham the throughput is normally 10 tons of mixed Durham coal per day, which by comparison with the performance of the Bow Common retorts, suggests a mean transit time of approximately 13 hr. The actual mean time in this installation is difficult to estimate because of the differential travel with mixed Durham coals; for the central part of the retorts it is 14 hr. with run-of-mine coal and approximately 12 hr. with stock coal or nut coals. The results obtained are thus seen to be in general agreement.

The transit time for No. 1 installation at Kensal Green was found to be 12.7 hr. When adjusted for the height of the retort, this would be equivalent to a transit time of 13.3 hr. in a modern installation. The mean cross-section of the retort is 963 sq. in. as compared with 1,230 sq. in. for No. 2 bench, Bow Common, and, after adjusting for this, the throughput of Durham coal per 10 in. nominal major axis is 0.90 tons per day, as with the 82 in. retorts. The coal throughput per 10 in. major axis in the 'twin 44-in.' retorts is 0.94 tons per day. It may be significant that the higher specific throughputs are associated with higher thermal yields. The 'twin 44-in.' retorts, which are installed at Kensal Green, have a standard minor axis taper, from 10 in. at the top to 18 in. at a depth of 18 ft., with a parallel bottom section. The results of performance trials showed the highest gaseous thermal yields recorded in any of the Board's installations of rectangular continuous vertical retorts. When carbonizing mixed Durham coals, however, travel was not easy.

The experiments with small coal have shown that there is no difficulty with the travel of coal of under ¼ in. size in retorts with continuous minor axis taper. The chief disadvantage is a reduction in throughput, which, for Durham coals, is approximately 20%. If means can be devised for carbonizing such coals at economic throughputs, there are certain advantages to be gained besides the reduction in segregation.

There is good reason to believe that a higher hydrocarbon enrichment value can be attained with small coals; tests carried out by the Fuel Research Board have shown an increase in H.E.V. of 2.1 therms per ton by reducing the size of Mitchell Main coal carbonized in continuous vertical retorts from 1½—¼ in. to ⅜ in.—0, and an increase of 4.1 therms with Dalton Main coal.

Carbonization of crushed coal also has the advantage of producing coke that is exceptionally large and strong for continuous vertical retorts, characterized by a uniform appearance and texture. This ash is uniformly distributed throughout the large, broken, and boiler nut sizes, but concentrated in the breeze. The absence of large shale in the sizes used for domestic fuel is of great value for boilers and closed stoves. The C.A.B. value of the coke was normal for continuous vertical retort coke. Ignitability in the open-grate test was good. The sole disadvantage was that the uniformly distributed ash tended to reduce radiation from the fire, but this was partly due to the high ash content of the coke. This would be less marked with coal obtained by crushing the larger fractions of run-of-mine varieties.

Carbonization of small coal at economic throughputs would appear to depend on the possibility of devising methods to improve the rate of heat transmission through the plastic layer.

The paper concludes by saying that the experiments on crushed coal have emphasized the importance of limiting the range of sizes of coal for carbonization in continuous vertical retorts, and suggest that, where difficulty with coal travel exists, this can be aggravated by an unsuitable size range. It is even probable that the haphazard addition of a limited quantity of nut coal to a nominally run-of-mine variety may produce a higher bulk density than normal, and thus make coal travel even more irregular.

The continuous minor axis taper employed in the Board's most recently constructed or reconstructed plants appears to be well suited to the purpose for which it was introduced, although it is possible that further improvement could be effected in the 103 in. downwardly heated retorts.

Improved coal travel has been only partly successful in improving the gaseous thermal yield from the larger sizes of retort. It is the author's present view that this is associated with the lower throughput per unit major axis of the larger retorts and that any improvement must be achieved by increasing the rate of carbonization.

DISCUSSION

Mr. H. Kerr (Woodall-Duckham Construction Co., Ltd.) remarked that the contents of the paper could be divided into three main sections: (a) The effect of coal size and segregation on coal travel; (b) the experimental data relating to the coal travel conditions in retorts of various sizes and having different retort profiles; and (c) suggestions for improving these conditions, especially with regard to the largest size of retort.

Mr. Lewis had mentioned the differing chemical and physical properties of coal. It ranged from the highly swelling Durham coals to the very easy travelling and low swelling coals in Scotland. It could vary in size from relatively large nuts down to slacks containing 65% or even more of less than ¼ in. size. It was carbonized to give gas of different calorific values at different works. The manager was no longer in a position to purchase the type of coal best suited to his particular requirements, and only rarely was it possible for him to use only one grade or type of coal. It was therefore necessary for the contractors to design their retorts to satisfy these varying conditions—and he submitted that they had met with success.

The experiments confirmed more accurately that the grading of the coal had a major effect on throughput. Practical experience over many years had shown that nut coals could be carbonized at a quicker rate than smaller coals of similar type, and low-swelling coals had a greater possible throughput than the more highly swelling kinds. The results, however, showed in no uncertain way the effect of coal size and of segregation when run-of-mine coal, consisting of a mixture of widely different sizes, was carbonized in large retorts. It was generally accepted that for constant coal travel to be obtained in continuous vertical retorts, one important factor was to feed coal of a uniform size. Whether or not continuous taper and/or the use of small coals would be beneficial for all carbonizing conditions, still remains to be proved. Mr. Lewis had stated that in the most recently built plants for the North Thames Gas Board, the continuous minor axis taper employed appeared to be well suited to the purpose for which it was introduced, namely the carbonization of Yorkshire and Durham coals producing high C.V. gas. However, he had gained the impression that the author was not altogether happy that the continuous taper used was the most suitable for the lower swelling coals. The arguments for and against different degrees and arrangements of minor axis taper were long and involved; and while he agreed in principle with the theoretical considerations put forward, it should be remembered that they were dealing with relatively small differences in dimensions over a given length of retort, and that other factors inherent in the carbonization of coal played a part. For example, although a retort was designed and built to a given taper, scurf adhered to the retort walls after the retort had been at work a short time. This took place in the upper zones and the growth of this material might add up to 2 in. of additional thickness to the walls. Since the scurf usually tapered off in thickness down to nothing near the base of the retort, the designed taper was continuously changing between the scurfing times. Continuous vertical retorts also suffered from the disadvantage of spalling in the upper silica zone.

In the section referring to the mean rate of descent curves, attention had been drawn to the increased rate observed in the upper section of the retorts. No mention had been made, however, of the coal deflecting plates. From his knowledge of these plates, they were designed deliberately to speed up the coal travel and ensure that the cool incoming coal passed quickly through that section of the retort in which the heavy tars condensed. This might explain to some extent the rate of change in the top 6 ft. of travel. A further factor affecting coal travel was the movement and displacement of the coke mass after leaving the retort brickwork and before being discharged over the coke extractor. This was a small but very important detail, and it would be of interest to know whether the effect of the relative positions of the coke extractor wheels to the minor axis centre line of the retorts and the curvature of the back plates had been considered. Last but not least, of course, was the effect of the combustion flue temperature zoning on the carbonizing conditions.

The experimental results were factual, if it was accepted that the travel rate of the entire charge was the same as that of the small individual radioactive tallies. This might not be correct but the number of tests which gave reasonable com-

arison suggested that it was so. It would, however, be of interest to know whether the tallies emerged from the retort encased in coke or whether they left in their free state. It would seem reasonable to assume the latter state, as instances had been cited when the tally dropped rapidly during some part of its journey due to the charge not being in contact with the end walls.

Mr. Lewis appeared to be of the opinion that there was an anomaly between the throughput and thermal yield obtained from the large 103 in. retorts as compared with the smaller-sized retorts; this difference in coal throughput was a well established and acknowledged fact. It was generally agreed that the relationship between the surface areas of the retort end walls and the retort side walls had a direct bearing on throughput because of the extra end wall surface per 10 in. of major axis in the smaller retorts.

Mr. Lewis had finally suggested that an overall benefit must be achieved by increasing the rate of carbonization, and had stated that the use of small coal at economic throughputs would appear to depend on the possibility of devising methods to improve the heat transmission through the plastic layer.

Mr. S. K. Hawthorn (Birmingham) remarked that the radioactive tallies technique was particularly useful in picturing the manner of coal descent, even when no interruptions occurred. It had been clearly proved that on 103 in. retorts, although the charge might move continuously, it moved faster down one end of the retort than the other, due to segregation. This finding was one explanation of the lower maximum flow per 10 in. major axis obtainable on large, as compared with smaller, retorts.

The author had emphasized the importance of regular and uniform coal travel; but in practice retorts were rodded at fixed intervals to overcome any tendency for the charge to hold up. It was a waste of effort, however, to rod a retort that was working smoothly—in fact, it might do more harm than good. An almost immediate warning of a sticking charge was given by a sharp rise in the gas uptake temperature, and he believed this could be used as a signal for rodding. The actual uptake temperature was not of prime importance, as it would vary within wide limits, depending on coal size and throughput. But invariably a sharp rise indicated that the charge had stopped moving. It was feasible to provide temperature recorders in every retort uptake and to rod only on indications of hold up rather than to a fixed timetable. In Birmingham they intended to install some such arrangement on a range of retorts which would be reconstructed next year. They were hoping to reduce the amount of rodding and at the same time to ensure against the sticking of charges.

There was a popular belief that small coal of under ½ in. size would not work satisfactorily in continuous vertical retorts, but the author had shown that with continuous minor-axis taper such coal could be carbonized without difficulty, provided the throughput is reduced.

In his opinion Fuel Research Technical Paper No. 26, published in 1930, had recorded one of the most valuable pieces of work ever carried out on carbonization in continuous vertical retorts. It had been clearly shown there that the H.E.V. (the therm was not then current) increased appreciably with smaller coal, and the value of the gas was also substantially higher. If the results of the test were corrected to a common calorific value by blue water gas, then the advantage from small coal was very pronounced. The other advantages of carbonizing crushed coal were the elimination of segregation in bunkers and retorts, stronger coke, uniform distribution of ash, correct sizes of coke and less breeze. The carbonizing of small crushed coals also offered an opportunity for blending and the elimination of the wide day-to-day variations in coal quality which frequently occurred at large works drawing supplies from a number of collieries. They often overlooked the advantage of small and medium-sized works in always handling a single coal. Conversely, they overlooked the disadvantages at large works of dealing with a very large number of coals with a very big variation from day to day. In spite of all the advantages of small coal, however, they came back every time to the reduction in throughput and an increased increment on capital charges.

They had heard a great deal about the Rochdale process and of the work with small coal. Would the Rochdale process solve the problem of successfully increasing the rate of coal travel of small coal in continuous vertical retorts?

Dr. A. E. Haffner (North Thames) said that the comparison of No. 1 and No. 2 benches at Bow Common had revealed that with similar coals at the same coal throughput and same coke extractor speed, the tallies descended in 9% less time in a retort that was 2% larger in volume. The coke also was of the same bulk density. He found it difficult to go all the way with Mr. Lewis in his explanation of this paradox. He had suggested that the coal core was travelling faster than the average and that the full space provided for expansion was not used by the rupturing coke monolith but by the coal bypassing into the annulus from above. But in the second retort there is less space (16.7 in. instead of 18 in. minor axis) for expansion down to 18 ft., and it only begins to be greater some 3 ft. lower down. Finally, it has a minor axis of 20 in. compared with 18 in. in the first installation. If bypassing of coal was to occur at appreciable rates, it would tend to occur more in the first than in the second installation as far as the top 21 ft. was concerned. Horizontal bypassing of coal into free annular space by breaking through the semi-plastic layer and between cracks in the monolith would maintain the higher velocity of the coal core, but this would come to an end as the coal began to be used up. The tallies did not show any slowing up towards the bottom of the retort. Wherever coal can bypass, a tally could go with it, and he wondered if there were any indications of that in the Bow Common experiments. They had seen the average of many hours of descent, but if the individual rates of descent were considered, one or two of these tallies might have chosen this route into the annulus.

The isotope tally test had been shown to be capable of demonstrating unsuspected phenomena. In one case it demonstrated that irregular travel was due to the filling up of the coke chamber, but they ought not to have waited for the splitting of the atom to find that out. But he was grateful for information that coarse coal segregated on the offtake side of the Fulham 103 in. retort, that segregation persisted in the retort, and that there was slower travel on the coarse coal side. Segregation of coal was familiar and caused a swing in calorific value between day and night, but its effect on the retort was not otherwise appreciated. The mechanism of the different rates of descent of the two halves was hard to visualize; it could only occur through splitting of the monolith, and that could do nothing but harm to the smooth travel of the coal. Had Mr. Lewis's experiments gone on at a time when the coal core in the bunker had become a crater and segregation had reversed? Had there been a reversal then of the left hand and the right hand side? In that case they might have had the left hand going quicker on one occasion than the right hand and then it would be reversed, so that there would have been a kind of rumba movement over the 24 hours.

The provision of taper right to the base of the retort in No. 4 retort house, Fulham, had, along with other improvements, been of direct benefit in improving coal travel with run-of-mine coal and had drawn all the more attention to the adverse effect of flaking or slag attack, which altered all the designed dimensions of the retort.

The isotope tally technique has been developed by Mr. Lewis and his group in spite of most difficult physical conditions. To operate a detector in combustion chambers was no mean feat. And if for the time being there might be no other programme of work of this kind, sooner or later there would be a problem that would require the technique. It was good to have experts and equipment ready to tackle future problems under conditions which could not be as difficult as those in which these trials had been carried out. A useful guide for the future had been provided.

Mr. M. S. Gaskell (Technical Director, West's Gas Improvement Co., Ltd.) said that this was the application of a technique which had not been applied previously in the gas industry. The author had given a lead which was definitely worth following, namely, an examination of techniques and methods employed in other industries or sciences with a view to their application, probably in a suitably modified form, in investigating problems in our own field. After all, regular coal travel in continuous retorts was possibly the most important factor in the operation of such retorts. Indeed, it was unquestionable, since it had a considerable effect not only on output, thermal yields and labour conditions, but in many cases on the life of the retorts. Investigations into the behaviour of the charge in a continuous retort were for

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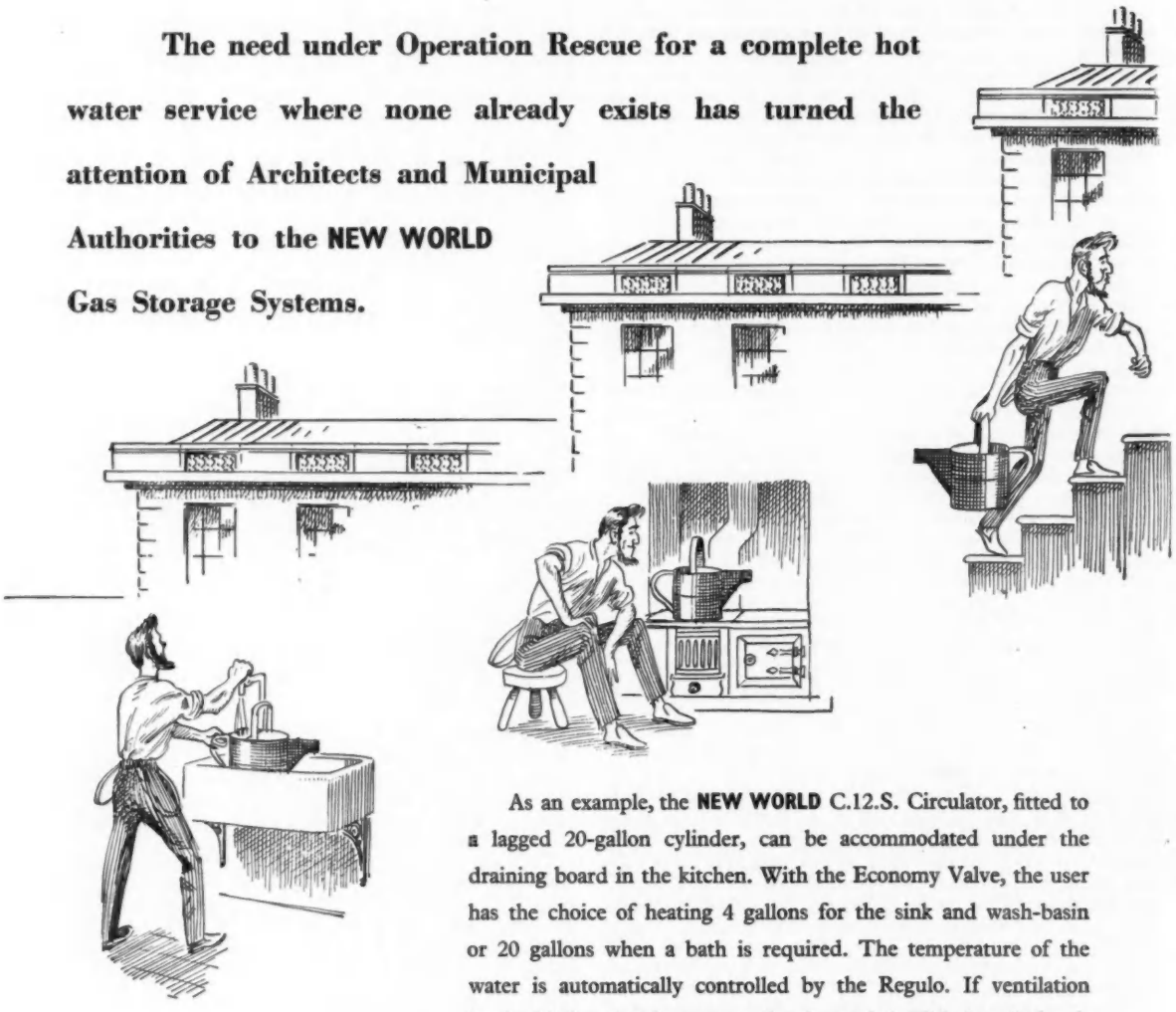

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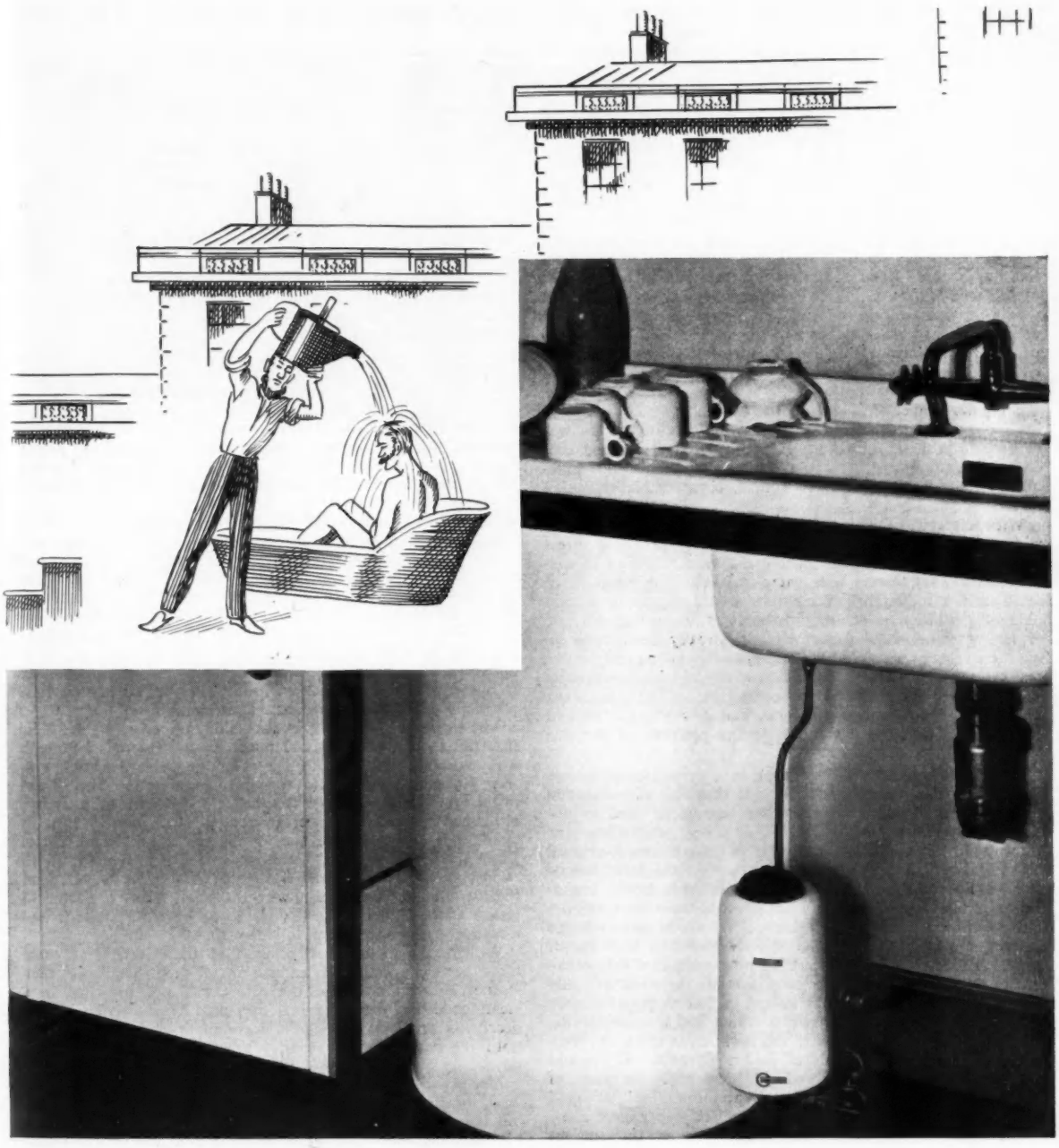

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obvious reasons difficult, but Mr. Lewis's work had advanced our knowledge in this matter and confirmed various theories which previously were in many cases based on speculation. If any slight criticism was possible, it might be suggested that the investigation as reported had been confined mainly to the effect of the taper of the retort to the exclusion of other factors in the design of the unit as a whole and its operation, which might have an equally important influence on travel.

One of these factors, which is external to the retort—namely, the effect of segregation of coal—had been described in the paper. It would appear that this segregation, while resulting in a difference of transit time at various points in the major axis of the retort, would materially affect the working of the retort as a whole. Perhaps Mr. Lewis would confirm or correct this impression. It was simply suggested that the main point of possible difficulty in securing regular travel was that at which the coal was introduced into the retort. If the design of the auxiliary coal bunker and top mouthpiece and the top of the retort were such as to facilitate the regular flow of coal, then—as Mr. Lewis's investigations had shown—in a retort of correct and continuous taper little difficulty in obtaining regular travel was likely to be encountered. It was interesting to note the author's statement that small coal was carbonised without difficulty. Experiments with crushed coal containing a larger percentage of fines had confirmed this statement, although there was, of course, considerable reduction in throughput.

With reference to the increased thermal yield per ton obtained with small coals, it was suggested that this is not a direct result of size reduction but of the resultant retarding of carbonization. Mr. Lewis had stated that the carbonization of small coal at minimum throughputs would appear to depend on the possibility of devising methods of improving the rate of heat transmission. Reference had already been made to the carrier gas process, and the recent investigations had proved that the increased heat transmission obtained with this process enabled small coals to be carbonized at an increased rate. This process had its own problems, and it was not at present certain that it offered a solution to the problem of the carbonization of small coals.

Mr. M. Redman (North Western), in a written contribution, commented that in spite of the fact that the carbonization process required the most expensive equipment used in our industry, there was no other process about which less was known, and this applied in particular to the continuous vertical type of carbonizing plant. Mr. Lewis's welcome paper helped them a little further along the road towards better understanding. In view of the important effect of the nature, amount and disposition of scurf in a vertical retort on travel of the charge, it was surprising that no reference to this matter had been made. Was he correct in presuming that the 'mean rate of descent' curves made no allowance for effect of scurf on transit times, since he was assuming that they represented the means of tests taken on retorts which had worked varying lengths of time since last being scurfed? Was there any progressive alteration in the rate of descent curve as the amount of scurf on a retort progressively increased? In view of what might be called the 'normal abnormalities' of coal travel, he would have thought it more likely to expect some lateral displacement of the tallies rather than the straight vertical descent which the author had assumed would occur. Mr. Lewis, however, had confirmed that the tallies travelled vertical paths but had noted that there was some 'significant deviations,' and he would like to know the extent of these and also the accuracy of measurement of lateral displacement of the tallies. It was interesting to note that they would be less likely to suffer lateral displacement if they were embedded in the coke skin formed near the top of the retort. The paper gave the impression that a tally was assumed to remain in the coal core and not find its way into the coke structure until it was well down in the retort. Whether the tally be assumed to be in the coal or in the coke did not appear to affect the overall conclusions drawn from the mean rate of descent curves about the degree of taper necessary in the retorts, because the rate of descent of the tally in the coke would be expected to decrease due to the increasing amount of fissuring of the coke lower down the retort if the taper were too large.

The observations of the author with regard to moderately swelling coals not fully utilizing the taper and filling the upper part of a standard retort were fully confirmed by recent work which had been carried out in the area of the North Western Gas Board; during this slack coal had been carbonized in various shapes of retorts and charges in rectangular retorts were quenched. He also confirmed the important observation which the author had made with regard to the contact of the charge with the end walls of the retort.

The author's important conclusion that small coal could be carbonized in continuously tapered retorts without travel difficulties was, however, of limited applicability in view of the increased capital charges per therm brought about by the reduced plant output implied by the lower coal throughput. Its application could, therefore only be where travel difficulties were particularly bad or when small coal was freely available at a low price. The means for increasing the throughput of coal in the vertical retort had been demonstrated in the North Western Gas Board by utilizing the Rochdale process and its advantages with regard to small coal carbonization had already been pointed out. It was interesting to note that these experiments had also shown the desirability of utilizing the continuous taper retort.

The author had stated that to increase the speed of carbonization of small coal it was necessary to devise methods to improve the rate of heat transmission 'through' the plastic 'layer', but perhaps this was not the best way to describe the problem since the transfer of an amount of heat 'through' a plastic 'layer' (where a continuous plastic 'layer' actually existed) would only result in a further plastic zone. When considering this problem it was useful to bear in mind two things—first, that the plasticity of coal at a temperature of some 300-500°C. had an important bearing on the formation of strong coke; and secondly, that coal could be carbonized at, say, twice the speed in a retort in two ways, either by carbonizing each piece of coal twice as fast (which entailed supplying twice as much heat to that piece in unit time) or, alternatively, by carbonizing two pieces of coal simultaneously (when double the quantity of heat was supplied in unit time but each piece carbonized at the original rate).

Mr. Lewis, in reply to the discussion, agreed with Mr. Kerr that the design of twin coal boxes in the retorts at Fulham was probably the culprit in perpetuating the difficulty with segregation. It would not appear to exist in the same form in an installation with a single coal box on each retort, although it might have occurred to a much less extent. It would not persist in one side of the retort but would rotate from side to side, as in Dr. Haffner's rumba movement. With regard to the effect of the end walls, it was very likely that they would find the reason why the small retort appeared to give a slightly higher thermal yield was purely because it had a higher proportion of end to side wall.

With regard to the effect of scurf on the retort, in all cases the experiments had been carried out in such a way that they started immediately after the retort was put to work in a clean condition. In general, they had been carried out as nearly as possible throughout a complete cycle of operation until the next scurfing, so they represented an average condition.

Mr. Hawthorn had suggested that rodding a retort might be waste of effort and might even do harm. He might be right, but the difficulty was to know when to stop. He hoped that his attempts with controlled rodding and the measurement of gas offtake temperatures would be successful. They knew that the measurement of gas offtake temperatures was very valuable as an indication of what the retort was losing. It had been used for many years for investigation purposes and had proved most useful.

As to the small coal experiments, they had not tried, so he did not know whether or not you could carbonize small coal successfully in retorts with a parallel bottom section. He hoped that they would be able to carry out further experiments with small coal in order to see whether or not they could work the process economically. He did not think reversal of segregation occurred in this particular installation, because there was always such a vast reserve of coal above the non-offtake side of the retort; and although that side took more coal, it never took so much as to produce a crater which would cause segregation to reverse. Finally, he entirely agreed that there was a close parallel between the results they had obtained with the radioactive tally technique and the results obtained by Weston which showed how very carefully he had carried out and analysed his experiments with that technique.

WATFORD BRIDES-TO-BE

Miss J. Hartgill, Home Service Adviser (Hemel Hempstead District) and judge of the contest; Miss Webb, 2nd prize winner; Mrs. E. Murphy, Home Service Officer, Gas Council, who presented prizes; Miss E. L. Burns, Home Service Adviser, Watford District; Mrs. Tansley, 1st prize winner; and Miss Manette, 3rd. Competitors included 'bachelor' office girls and young brides.

Mrs. E. Murphy, Home Service Officer, Gas Council, attended on December 2 the final night of an eight-week course for brides-to-be held in the Watford District showrooms at The Parade, Watford, to present prizes to the winners of a mince-pie contest. For the third consecutive year these popular courses have been held in four centres of the Division: Watford, Luton, Hemel Hempstead, and Luton. Average nightly attendance at each centre has been in the region of 85. Held on one evening per week, the courses end with a cookery contest which enables students to put into practice what they have learned from the Board's home service advisers. There is no enrolment fee.

RINGELMANN SMOKE CHARTS

The report of the committee on Air Pollution includes a reminder of the utility of Ringelmann smoke charts, which have been found in use at the fuel research station to give more consistent results than other variants of the Ringelmann scale for estimating the density of smoke emission from factory chimneys. The committee has recommended that smoke of Ringelmann shade No. 2 should be deemed 'dark smoke' and that heavy penalties should be imposed for the emission of smoke darker than this during more than a limited period in each working day.

The charts comprise a number of 4 in. square diagrams made up from straight lines crossing at right angles to each other. The thickness of these lines varies with each diagram on the chart which has the effect of causing a difference in the tint density. The intensity of smoke leaving a chimney is estimated by comparing its shade with the standard shades of the Ringelmann smoke chart. The intensity is recorded as a Ringelmann number, this being the number of the standard shade most closely resembling the smoke. When using these charts it is recommended that they are mounted on a board, so that no margin intervenes between the squares and the edge of the mounting board. The chart should be so fixed that it may be seen as nearly as possible in line with the top of the chimney. It is also recommended that the chart and the top of the chimney should be surrounded by the same background of sky, and that the distance of the chart from the observer should be such that each square appears of uniform shade, say about 50 ft. The chart should preferably be used with uniform illumination from the sky. If observations must be made with the sun shining, or with the sky bright on one side, the bright illumination should be approximately at right angles to the line of vision and should not be behind or in front of the observer.

Ringelmann smoke charts, which are copyright, are published by Charles Griffin & Co., Ltd., 42, Drury Lane, London, W.C.2, price 1s. 6d. for three; 2s. 6d. for six; and 4s. 6d. for 12.

A New Tariff which the Scottish Gas Board proposes to apply to the supply of gas for street lighting in Galashiels has been accepted by the Town Council. In submitting the tariff, the Board stated that it did not consider street lighting to be an industrial load and that it did not, therefore, qualify for a special tariff. The tariff is: First 8,500 cu.ft per survey period, 6s. 6.6d. per 1,000 cu.ft.; next 183,000 cu.ft., 5s. 10.2d.; next 188,000 cu.ft., 5s. 5.9d.; next 4,700,000 cu.ft., 5s. 1.6d.; over 5,084,500 cu.ft., 4s. 9.4d.

Corrosion in the Home

An exhibition demonstrating materials and methods used in limiting corrosion in the home will be held in the Great Hall of Battersea Polytechnic, London, S.W.11, on January 21, from 10 a.m. to 4 p.m. Admission is free, and no ticket will be necessary. There will be a private showing the previous day to members of the Corrosion Group of the Society of Chemical Industry, who are organizing the exhibition.

Metals have innumerable household uses. To mention only a few examples: outside the house, metal may be found in windows, rainwater gutters and pipes, gates and fences; inside, there may be water cisterns, pipes, cooking vessels, cutlery, kitchen tools, stoves, washing machines, buckets and shovels. The uses are diverse but they have one feature in common; if the metal or the protection given to it is not well chosen its appearance and usefulness will deteriorate through the action of corrosion.

The articles and utensils included in the display will fall into four categories —building materials, plumbing, domestic equipment and tools, and ornamental metalware, providing a comprehensive demonstration of the formidable extent of the corrosion problem and the protective methods which are being developed to combat it.

Ideal Home Exhibition

The Gas Council, together with 12 gas equipment manufacturers, will be responsible for a complete Gas Section in the Grand Hall of Olympia at this year's Ideal Home Exhibition. A Gas Pavilion is planned by the Council. The theme of the exhibit will be 'The Happy Home,' which is linked with a manual of the same title which the Gas Council, pioneers of kitchen-planning and home comfort, has prepared in collaboration with *Good Housekeeping*. Publication of the book, which will be on display, will coincide with the exhibition, and the exhibit will illustrate some of the interesting contents in regard to home-making.

The outstanding feature of the pavilion will be three different full-scale kitchens, planned in every detail from colour scheme, labour-saving design to modern gas equipment. Sections of other rooms, showing gas appliances, will also be featured.

The emphasis this year will be on colour and details, and charts will be shown. Tools for the smooth running of a kitchen, and the latest appliances, will also be exhibited, some for the first time.

Grouped round the Gas Pavilion will be the stands of Ascot Gas Water Heaters, Ltd., Bratt Colbran, Ltd., Cannon (G.A.), Ltd., Thos. De La Rue & Co., Ltd., Ewart & Son, Ltd., Sidney Flavel & Co., Ltd., General Gas Appliances, Ltd., R. & A. Main, Ltd., Parkinson Stove Co., Ltd., Radiation Group Sales, Ltd., Stoves, Ltd., and Vulcan Stove Co., Ltd.

Institution Examination Results

The Institution of Gas Engineers has issued a Supplementary Pass List in respect of the 1954 examinations, incorporating a list of the candidates who have been awarded the Certificate in Gas Salesmanship and Consumer Service. The following candidates passed the main subject examination under the old Regulations and have now qualified for the award of certificates by completing outstanding ancillary subjects.

HIGHER GRADE EXAMINATIONS. Internal Candidates. Gas Engineering (Manufacture).—2nd class: Spriggs, L. (East Ham College). Gas Engineering (Supply).—Booth, R. (Burnley College); Hall, H. V. (Manchester College); McGrath, J. F. (Westminster College).

ORDINARY GRADE EXAMINATION. Internal Candidate. Gas Engineering (Manufacture).—2nd class: Spriggs, L. (East Ham College).

CERTIFICATE IN GAS SALESMANSHIP AND CONSUMER SERVICE

(First Class)

Name.	Area Board.
Archer, L. J., London	North Thames
Baker, R. T. H., Romford	North Thames
Baynes, D., Swanage	Southern
Cockburn, R. G., Sheffield	East Midlands
Collins, F. A., Ruislip	North Thames
Dixon, P. D., Cheam	North Thames
Gerhold, C. F., Redhill	North Thames
Greatrex, E. J. H., Sutton Coldfield	West Midlands
Green, J. R., New Barnett	Eastern
Hall, D. H. W., Cambridge	Eastern
Hite, M. G., London	North Thames
Marsh, J. S., London	North Thames
O'Leary, J. B., London	South Eastern
Oliver, I. D., Wembley	North Thames
Pointeer, H. E., London	North Thames
Skinner, W. A., London	North Thames

(Second Class)

Almond, W. R., Deal	South Eastern
Allen, F. W., Watford	North Thames
Barker, W., Watford	North Thames
Barnard, H. F., Romford	North Thames
Beales, J. E., London	North Thames
Blott, W. H., London	North Thames
Bromfield, V. E., London	South Eastern
Christian, D. G., London	North Thames
Clark, H. W., Dagenham	North Thames
Clarke, A. L. J., London	North Thames
Clarke, G., Cottingham	North Eastern
Davies, A., Abertillery	Wales
Drake, J., Chigwell	North Thames
Dyer, E. P., London	North Thames
Edwards, S. H. E., Birmingham	West Midlands
Elliott, A. W., Morden	North Thames
Finn, T., Sunderland	Northern
Frost, W. G., Wallington	North Thames
Hobrough, J. T., Colchester	Eastern
Hutchings, P., Oxford	Southern
James, R. H., Romford	North Thames
Johnson, C. G., Rayleigh	North Thames
Kimpton, T. C., Edgware	North Thames
Lemon, E. V., Epping	North Thames
Lewis, L. A., London	North Thames
Madden, E., Port Talbot	Wales
Maitland, J. J. H., Northolt	North Thames
Marshall, E. A., London	North Thames
Mitchell, V. J., Harlow	Eastern
Orange, N. S. A., Woodford Green	North Thames
Quin, G. F., Worthing	South Eastern
Rowett, T. R., Boston	East Midlands
Rushton, J. H., Dunstable	Eastern
Sears, R. G., London	North Thames
Smith, C., Hertford	Eastern
Smith, F. E., Reigate	South Eastern
Smith, S. F., Walmer	South Eastern
Spicer, D., South Ruislip	North Thames
Stephenson, T., Wallsend-on-Tyne	Northern
Sumner, B. J., Birmingham	West Midlands
Timms, A., Pontypool	Wales
Vincent, R. H., Royston	Eastern
Wells, A. G., Broxbourne	Eastern
Wilson, J. E., London	North Thames

ASSOCIATE MEMBERSHIP EXAMINATION Gas Engineering (Supply).—Canter, M. J. T. (Birmingham); Cooper, D. (Shipley); Tordoff, B. S. (Bradford).

Accompanying the lists of examination successes is a report of the Sales Training Committee, which refers to the loss sustained by the sudden death of Mr. F. A. Cheeseman, who had been associated with the work of the Committee, either as a member or as an Examiner, since its inception. The death of Mr. A. J. Privett (Portsmouth) was also a sad loss since, he, too, had acted as an Examiner for oral examinations since the initiation of the Certificate in Gas Salesmanship and Consumer Service. The Gas Council has appointed Mr. F. E. F. Salter (Croydon) to fill Mr. Cheeseman's place.

The Committee has given consideration, during the year, to the desirability of including in the curriculum for the Certificate in Gas Salesmanship and Consumer Service some reference to the use of coke for domestic purposes. It is appreciated that in some areas the sales of coke and the provision of technical advice thereon are delegated to separate departments, but this does not appear to be universal throughout the industry. In any event, it is considered by the Committee that the district representatives and showroom personnel who are in daily contact with the consumers and for whom the Certificate in Gas Salesmanship and Consumer Service is primarily intended should be equipped with sufficient technical knowledge to be able to advise upon the use of coke for domestic purposes. This is more important by reason of the considerable publicity now being given to the use of smokeless solid fuels. The obvious part of the curriculum in which to include a section relating to the domestic utilization of coke is in Gas Technology (Supply)—Part I, and the suggested addition to the syllabus has accordingly been referred to the Advisory Committee of the City and Guilds of London Institute on Gas Technology.

Oral Examinations 1953

The oral examinations of successful candidates in the written examinations held in April, 1953, were conducted in October and November, 1953 at four centres. In accordance with the policy of the Committee, efforts were made to ensure, as far as was practicable, that no candidate was examined by his own senior officers. This procedure involved travel on the part of some students and of Examiners, but it was felt that the obvious advantages outweighed the inconvenience and expenses involved.

The regulations provide for the raising or lowering of the class of award by the Examiners as a result of the oral examination and the summary of results given below indicates that in certain instances the Examiners found the procedure appropriate. In their observations on the examinations the oral Examiners report that generally they were impressed with the enthusiasm and the level of confidence shown by the candidates. Some Examiners found that many candidates lacked the ability to demonstrate equipment and that others were hazy as to the average consumption to be anticipated from various classes of consumers. There were certain candidates, fortunately few in number, who, it was felt, should not have been encouraged to pursue the course of study, since in the opinion of the Examiners, they were quite unsuited for the work of a district representative. This is a matter to which the education officers of area boards and others responsible for advising young men as to their training are no doubt giving attention.

Summary of results of the Oral Examinations–1953.

Class of award	Number of candidates on the results of the written examinations	Number of candidates on the results of the oral examinations
First class ..	6	13
Second class ..	47	32
Fail	—	8
Total ..	53	53

Written Examinations 1954

The Sales Training Committee appointed Mr. C. C. Knights to conduct the examination in Part A of the paper in the Principles and Practice of Gas Salesmanship and Mr. S. A. King and Mr. J. W. Rodgers to conduct Part B.

The number of candidates entering for the examination was slightly lower than last year, but the results show a decided improvement, the percentage of failures having decreased from 39.5 to 19.6. Although the average results obtained by external candidates is slightly higher than those gained by the internal candidates, particular credit is due to the teachers at two colleges, Westminster and Tottenham, the candidates from which did very well indeed. The former of these colleges entered 28 candidates, eight of whom obtained first class passes and only one failed, and the latter entered seven candidates, three obtaining first class passes and four second class passes.

The report of the Examiners on the written examination says the examination comprised two parts, for each of which five questions were set, the candidates being invited to attempt three. The results obtained are summarized in the following table:

Class	Internal—84		External—28		Total—112	
	No.	%	No.	%	No.	%
First	15	17.9	6	21.4	21	18.8
Second	52	61.9	17	60.8	69	61.6
Fail	17	20.2	5	17.8	22	19.6

On the whole, the standard of English was satisfactory, but poor spelling was frequently displayed. Fewer students this year attempted to pad out their answers with irrelevant material. A common fault was to treat the subject matter too superficially; it could have been wished that the examinees would dig a little deeper and offer more penetrating analyses of the problems posed.

The Institution Christmas Lecture

Dr. Haffner on 'Production'

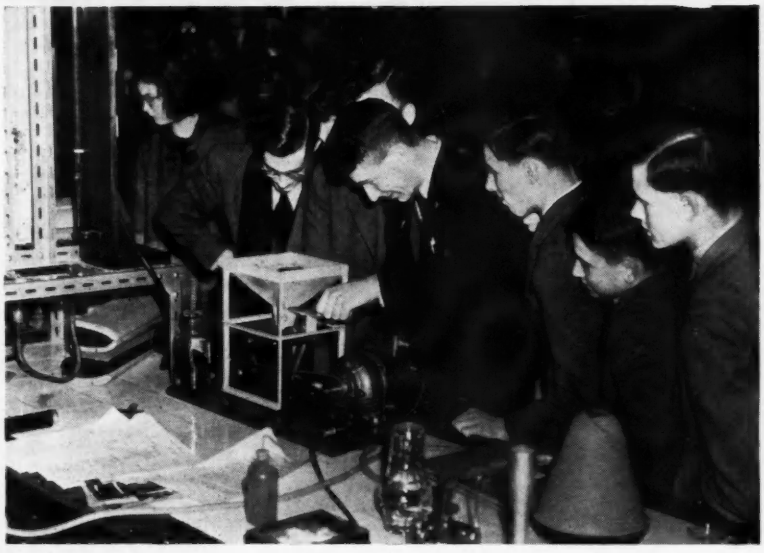
AGAIN an unqualified success, the fourth Institution of Gas Engineers Christmas lecture for young people was given on January 4 by Dr. A. E. Haffner at the Royal College of Science, London. Dr. Haffner chose as his subject 'The Production of Fuel Gases.'

The lecture was supported with practical demonstrations and experiments. Speaking at just about the right level of comprehension for the young students, Dr. Haffner brought shafts of humour into use now and then to ensure that at no time did the proceedings become dull.

Starting off at the elementary plane of gasification of carbonaceous material by air, steam or oxygen, the lecturer explained the principle of underground gasification of coal. He spoke of how the characteristics of coal are taken care of in retort design and of the purification and storage of fuel gases.

Working with the smooth efficiency of a conjurer, with the assistance of colleagues from the North Thames Gas Board, Dr. Haffner delighted his audience with a demonstration of the Geiger-counter. He allowed them, during the interval, to try the enormous range of specially-rigged apparatus for themselves.

Briefly, he explained the natural gas position at home and abroad, and spoke of the necessity to find alternative sources of fuel to that of coal. 'Coal is fast disappearing,' he said, 'and we are having to look for other raw materials in order to meet the rising demands which are associated with industrial productivity and higher standards of living.' Dr. Haffner said the utilization of fuel gases would be next year's lecture.



In the top picture the camera has caught the concentration of a section of the audience, some of whom were not as juvenile as one might expect! The other shot is of some of the audience inspecting a model De Brouwer charging machine during the interval.

In this picture Dr. Haffner is describing, by means of a model, the construction and operation of a continuous vertical retort.

Other subjects explained by Dr. Haffner were the production of gases by distillation, and thermal or catalytic cracking of oil; acetylene production as an example of a chemical process; hydrogen production by electrolysis and electricity production from a fuel cell; recovery of methane from coal mines and an unusual application of the gas turbine; production of fuel gases by fermentation; and some aspects of the scientific control of fuel gas production to illustrate the importance of traces of compounds which can only be measured in 'parts per million.'

Dr. Haffner, who is Station Engineer at the Fulham works of the North Thames Gas Board, carried out research on high pressure gas reactions at the Imperial College before entering the gas industry where he worked first on research on gas making processes and later became responsible for gas production.

Mr. W. K. Tate, President of the Institution of Gas Engineers introduced Dr. Haffner to his audience.

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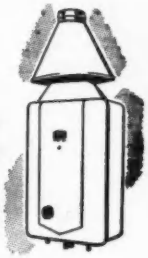

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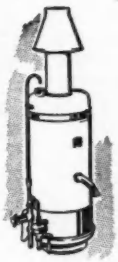

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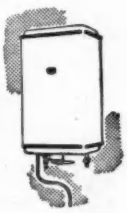

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Tenants to Provide Cookers

By eight votes to four, Galashiels Town Council has decided that tenants in housing schemes in the town will in future have to provide their own gas cookers and wash boilers. This decision will apply to the latest development of the scheme under construction at Gala Policies.

The Housing Committee reported that it had received a quotation from the Scottish Gas Board for the provision of cookers and boilers along with the necessary services. Although there had been a provisional sum of £36 allowed in the schedule of the plumbing work to cover these items, the committee recommended that they be not provided.

Bailie J. W. Halls said that if this step was taken it would mean a further reduction in the standard of the houses being constructed at Gala Policies. Tenants were entitled to have something with which to cook and wash.

Bailie Grant said that the committee's recommendation was right. No private landlord provided gas cookers and wash boilers.

Bangor Gas Centenary

Over 100 guests attended a dinner given by Bangor (Co. Down) Borough Council on December 17 to mark the centenary of the local gas undertaking. The Mayor (Councillor D. Ewatt) presided and the guest of honour was the Minister of Commerce, Lord Glentoran.

Alderman Thomas Bailie, proposing the toast of the Bangor Borough Council gas undertaking, said those who had been engaged for varying periods in the service of the Borough could look on its progress and expansion with justifiable pride. Bangor 100 years ago was little more than a village with a population in the region of 2,000. Today it was large and cosmopolitan.

In 1883 the output was just over 1 mill. cu.ft. and there were 121 consumers. Today the corresponding figures were 300 mill. cu.ft. and 7,522 consumers. The price of gas in 1883 was 5s. per 1,000 cu.ft. Today the price was 5s. 7½d., so that it could be correctly stated that the cost of gas to consumers in 1954 was practically the same as it was in 1883.

This was a remarkable accomplishment, and reflected credit on those who had held positions of responsibility since earlier years. Alderman Bailie said he believed he was correct in stating that the price now being charged in Bangor was the lowest in the United Kingdom.

Alderman F. Logan, who has been Chairman of the Gas Committee for 17 years, responded.

Councillor F. C. Toughan, proposing the toast of the Government of Northern Ireland, paid tribute to the friendly co-operation the Council had always received from the various departments of the Government.

Lord Glentoran, responding, complimented the Council on the continuous smooth functioning of its gasworks throughout a long and difficult period of coal shortages, rising coal prices, and other costs. The story of the expansion of the undertaking from the time it was taken over by the Town Commissioners in 1883 was the story also of the expansion of Bangor.

Gas or Electricity Problem

Sir Robert Nimmo, Chairman of the Scottish Gas Consultative Council, said at Dunfermline on December 17 he hoped there would be some guidance from a higher level about cooking facilities in local authority houses. He was addressing the Central District Committee of the Council, which covers Fife, Perth, and Angus. He said there had been concern about the question of tenants' freedom of choice as to whether gas and/or electricity should be installed in houses.

There was an enormous amount of capital invested in gas and electricity today. It was obvious that while there must be a certain amount of competition, it must be viewed in the light of the ultimate economies of the two industries. There had been difficulty lately when local authorities were considering whether to put electricity or gas installations for cooking in their houses. The electricity people said there should be freedom of choice for the tenant. The Gas Board said it was wrong there should be all-electric houses.

Vacuum Cleaning in Mines

Interest has been created by reports in the national newspapers and on the radio concerning vacuum cleaner tests in coal mines to help to prevent pit explosions. It is now over two years since the British Vacuum Cleaner & Engineering Co., Ltd., was approached by officials of the inspection department of the Ministry of Fuel and Power to investigate and produce an experimental unit for the removal by vacuum process of dangerous dust in coal mines.

From that time onwards a team of B.V.C. technicians devoted much time and research in conjunction with members of the National Coal Board to produce an experimental prototype (B.V.C. model T.91). It was as far back as 1907 that a 3-operator mine plant was produced by Mr. H. Cecil Booth, F.C.G.I., M.I.C.E., inventor of the vacuum cleaner and founder of the B.V.C. & Engineering Company. This first machine was tried out by Mr. Booth at the time for cleaning dust from the brick-built safety zones at Whitwood Collieries but was not adopted, the problem being too vast to be coped with at that time.

In a report on this subject Mr. Seymour Booth, who until recently was a Director in charge of all these experiments, made this comment: 'The greatest incentive to my mind is that we may be pioneering one of the greatest revolutions in mining history by reducing largely the incidence of death to the miner from disease and explosion.'

Education and Industry

The Federation of British Industries has published a small booklet under the title of 'Public School and Grammar School Boys in Industry' (Price 1s.). It suggests that industry is in danger of neglecting the public schools and grammar schools as a source of potential managerial talent and proposes a simple scheme for providing careers advisers with information about the prospects in industry in a handy form.

The booklet points out that as a result of educational changes since the war many more grammar school boys remain at school until they are 17 or 18, as the public school boy normally does. The experience they gain in the sixth form is of great value in developing personal qualities such as leadership and a sense of responsibility.

The booklet goes on to suggest that, as schoolmasters in general are less familiar with the prospects in industry, firms which can offer training and posts suitable for public school and grammar school boys should summarize this information on a standard index card and arrange for cards to be distributed to the appropriate schools. Detailed suggestions are made for distribution, in which the Central Youth Employment Executive and the Public Schools Appointments Bureau have undertaken to co-operate.

Company News

ALLIED IRONFOUNDERS

An interim ordinary dividend of 5%, against the equivalent of 3¼% a year ago, is declared by the board of Allied Ironfounders on account of the year to March 31, 1955. The previous year's actual dividends of interim 7½% and final 15% on the capital prior to the 100% free issue, are equivalent to a total of 11¼% on the present £4,875,918 equity.

SIDNEY FLAVEL

At the annual meeting of Sidney Flavel & Co., Ltd., the Chairman, Mr. Duncan Wright, C.A., stated that the Company had made steady progress. He referred to the increased costs of raw materials, supplies, and labour which have been partially offset by substantially higher production and efficient manufacturing methods. To enlarge the range of gas appliances, the Company had purchased the National Water Heater Company and was developing, on 'National' principles, several types of water heaters which would be in production during the next few months. New gas cookers incorporating a number of original features were in course of preparation and research was being carried out to consider the application of natural gas and oil for cooking and heating appliances for the export market. The Board recommended a final dividend of 9%, which together with the interim dividend of 6%, makes a total distribution of 15% for the year and represents an increase of 2½% over the previous year.

NEWS IN BRIEF

Scottish Juniors (Western District) are to pay their postponed visit to the Falkirk works of R. & A. Main, Ltd., on March 16. Mr. W. A. Green, Hon. Secretary, informs us that a coach will leave Paisley at 12.15 p.m. and Glasgow at 1 p.m., and the return from Falkirk will be at 7.30 p.m.

The Annual Luncheon of the British Industrial Measuring and Control Apparatus Manufacturers' Association will be held at Londonderry House, 19, Park Lane, W.1, on January 18. The principal speakers will be Sir Edward Boyle, Parliamentary Secretary to the Ministry of Supply, and Sir Roger Duncalfe, Chairman of British Glues and Chemicals, Ltd., and Deputy Chairman of the Beaver Committee on Air Pollution.

Productivity Increases of between 5% and 6% were recorded in the first two quarters of the North Western Gas Board's current financial year (beginning April 1, 1954), and there was an increase of 5.3% during October. The gas made available per employee in November, at a weekly average of 91,700 cu.ft., was 5.6% up compared with the average a year previously. Including the results for November the average productivity for the first eight months of the Board's current financial year was up by 5% compared with the average for the corresponding period of the previous year.

In Addition to the calendars and diaries acknowledged last week we have received a colourful monthly tear-off wall calendar from the Wellman Smith Owen Engineering Corporation, Ltd.

The Scottish Committee of The Council of Industrial Design has produced a report on this year's Scottish Design Congress in Edinburgh. It is called 'The Value of Good Design,' and costs 2s. Mainly featuring domestic designs, the book also illustrates improved designs in machinery. The book is largely composed from papers read at the Congress. The address of the Scottish Committee is 95, Bothwell Street, Glasgow, C.2.

The United Steel Companies, Ltd., had a record steel ingot production of 2,492,756 tons in 1954. This is the highest ever produced in the British Commonwealth by a single company in one year and beats United Steels' previous Empire best of 2,374,687 tons in 1953 by more than 116,000 tons. Pig iron production also reached a record level of 1,451,084 tons during the past year. Each of the Company's branches made a handsome contribution to the total for the Groups and each had a record year. Appleby-Frodingham, for instance, produced more than 1 mill. tons of steel for the second year in succession.

Aberdeen Chamber of Commerce is in favour of smokeless areas being established in the city. The Chairman, Mr. A. E. Walker, at a recent meeting, said that he thought members would be in entire agreement that smokeless areas should be created to such an extent that Aberdeen could become as near as possible a smokeless city. The meeting was discussing a provisional order which is being promoted by Aberdeen Corporation.

Festive Fare

Following the success of the 'Festive Fare' cookery demonstrations organized in 1953 in collaboration with the Scottish Gas Board and R. & A. Main, Ltd., the Glasgow *Evening Citizen* again included a similar series in its Housewives' Club programme for December. The demonstrations took place during the week ended December 10 at the Scottish Gas Board's Sauchiehall Street showrooms, which accommodate between 150 and 200 persons.

Using a Main No. 20 'Century' and a Main No. 109 'Economain' cooker, Miss Helen Main, Chief Demonstrator, R. & A. Main, Ltd., carried out a series of practical demonstrations of Christmas recipes which were followed with great interest by the many club members and their friends who attended.

COKE BURNING DISPLAYS AT BRADFORD

The Bradford Industrial Section of the North Eastern Gas Board borrowed a No. 4 Copperad Auto Burner from Copperad Auto Burners, Ltd., for use as the central feature of a showroom display at Britannia House, Bradford, for three weeks last month, following which it was displayed for three weeks at the Appliance Section in Mill Street, Bradford. The combustion chamber was converted into an effective live display by the use of an illuminated imitation domestic coke fire surrounded by actual coke of the appropriate size. A large display panel with suitable written matter, together with photographs of existing installations, was incorporated, and the whole tied up with a 'Smog' caption covering the new Bradford smokeless zone. Over 30 heating engineers, architects, and other persons interested were contacted and 10 visited the showrooms to inspect the display, expressing great interest in the exhibit. They were interviewed and given advice on the exhibit, while the coke representative was permanently on duty throughout the whole period.

The showroom display at Britannia House.

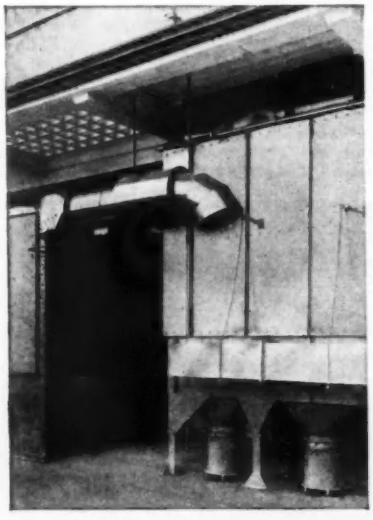
TRADE NEWS

Silencers for axial flow fans

A simplified method of reducing the sound level in fan systems has been introduced by Woods of Colchester, Ltd. It takes the form of a range of standardized absorption-type silencers for use in conjunction with the Company's 'Aerofoil' fans. They are the result of extensive laboratory investigation, the design being selected to match the sound frequency range of the 'Aerofoil' fan.

With one or more of these units, the sound emission from the fan can be attenuated (reduced in intensity) to suit the requirements of the installation and costly acoustic treatment to the system ducting can be avoided. The silencer also provides much more latitude in the selection of small, high-speed fans in the interests of space-saving and first cost.

The Woods silencer takes the form of a simple cylinder, devoid of splitter or baffles and presenting relatively no more resistance to airflow than a plain metal duct. The outstanding feature of the design is the exceptional sound attenuation achieved in so short a length—approximately 1½ times the duct diameter.

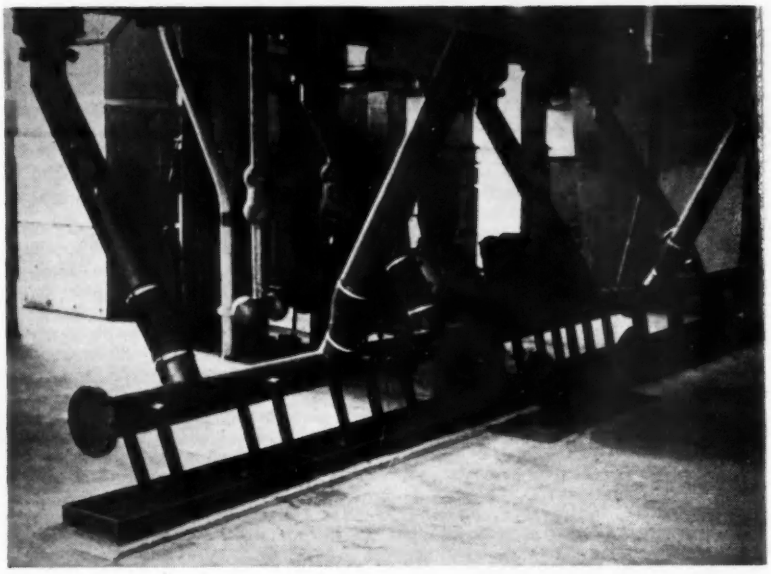


One of the new Woods of Colchester, Ltd., silencers mounted on a two-stage 'Aerofoil' fan extracting from a zinc spray booth.

To obtain the optimum effect in sound reduction the silencer should be mounted right beside the fan, and between the fan and the place at which the noise may be objectionable, whether upstream or downstream of the fan. In some cases where all round quietness is required, silencers may be fitted on both sides of the fan.

Silencer units are available in six sizes to match 'Aerofoil' fans from 15 to 48 in. diameter. To facilitate direct attachment to the fan the end-rings are drilled and tapped to the same pitch centres as the fixing holes in the fan flanges. Where two or more silencers are to be mounted in series, a short connecting duct-section having flanges at each end can be supplied. Attachable mounting feet can be fitted, as on the fans. Eye-lugs for slinging are provided on silencers of 30 in. diameter and upwards.

Before assembly, all interior surfaces of the silencer casing receive an anti-corrosive coating of a specially formulated red oxide type primer. Exterior surfaces are given a priming coat of red oxide followed by a standard coat of grey alkyd resin paint which affords a durable, weatherproof finish.—*Woods of Colchester, Colchester, Essex.*



This vibrator type conveyor is handling hot ashes from boiler plant at a large power station.

'Owl' vibrator type conveyors

'Owl' vibrator type conveyors of tubular construction are suitable for conveying a wide variety of materials such as coal, coke, cinders, loose cement and chemicals. Single unit conveyors are capable of handling up to 100 tons per hour on certain classes of materials and in some instances capacities in excess of this figure may be expected. Where higher tonnages than this are required to be dealt with, two tubes can be installed parallel to each other and fed by means of a bifurcated chute, thereby doubling the handling capacity. Several of these units can be installed in tandem to give any length of conveyor run.

Inlet and/or discharge outlets can be fitted where required, at practically any point along the run of the conveyors. This feature makes them ideal for installation where a series of bunkers or hoppers have to be fed or discharged, claim the makers.

Material can be conveyed by these conveyors up to an angle of 20°, but it is the usual practice for the manufacturers to carry out tests on the particular material to be handled before a decision can be made regarding the maximum practicable inclination which would be consistent with highest efficiency.

This tubular vibrator conveyor is particularly suitable for handling dusty materials where total enclosure is essential. It has an especial appeal for the handling of hot materials such as coke, cement-clinker or sinter, and the compact construction lends facility of installation where space is restricted. These conveyors may also be of trough construction.

The conveyor shown in the photograph is powered by two totally enclosed motors coupled by an intermediate gear box. The complete driving unit is mounted on the tube by means of a fabricated saddle, either under or over the tube, to suit installation conditions. All tractive forces and pressure strains are compensated in the articulated laths which couple the conveyor tube to the steel fabricated base, thereby confining the vibration to the conveying element and ensuring efficient transit.

The manufacturers are prepared to carry out tests on customers' own materials without obligation.—*Owl Engineering Supplies, Ltd., Doncaster.*

Lead putty 'Epetam 3311'

Lead putty 'Epetam 3311' designed to make pressure-tight cup joints in plumbing systems has been developed by Perdeck Solder Products, Ltd. The putty enables such joints to be made simply and rapidly, say the makers.

First the brass or other non-ferrous metal insert is tinned with another product of the same firm—solder paint 'Epetam 3311.' Next, the insert is tapped into place inside the mouth of the lead pipe and gap surrounding it is filled up with the lead putty.

Heat is then applied to the insert and the putty (which has a melting point only just below that of lead) with a blow-lamp.

When the putty has melted it is wiped with a damp rag and the joint is completed. The joint is so firm that impacts sufficient to bend the lead piping like a whipcord will not move it. At the same time, the pressure resistance of the completed joint made with the putty is as great as that of a standard ovoid solder joint, although the amount of solder putty used is of the order of a teaspoonful, instead of the large portion of a bar of solder needed to make cup joints of conventional type, it is claimed by the manufacturers.

Say Perdeck Solder Products: 'Lead putty "Epetam 3311" was originally designed for "burning in"—*i.e.*, to hold the insert in place prior to and while wiping a joint of plumbers' solder around the assembly. However, as tests show that a brass or copper pipe-to-lead pipe joint withstands considerable impact, pull and pressure, if assembled with our lead putty only, it suggests that this would suffice for at least all waste pipe joints.

'In this connection, exhaustive tests will be carried out in co-operation with water and gas authorities.'—*Perdeck Solder Products, Ltd., Abbey Mills, Waltham Abbey, Essex.*

High frequency ignition

The Plessey Company in conjunction with D. Napier & Son, the Patentees, have developed a new type of ignition system operating on the capacitor discharge principle. The necessity for this new type of ignition results from the greater energy requirements for the ignition of fuels of low volatility used in gas turbines or oil-fired boilers.

This system, termed a high frequency system, has definite advantages for some applications, say the makers, because of its high spark repetition rate, its low initial firing delay, and its use of a conventional type of sparking plug. The insulated gap of the igniter plug employed with the Napier-Plessey system is ionized by means of a high frequency, high voltage initiating surge which is immediately followed by a low voltage discharge of relatively large energy content. The high frequency component is additionally advantageous in ensuring a discharge through fouled plugs, but the combined discharge is, however, non-lethal.

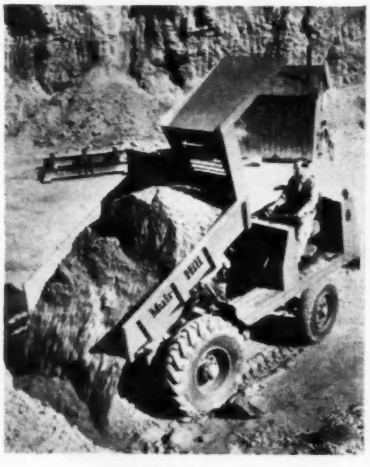
The generally lower volatility of the fuel used for small turbines means that somewhat greater energy is required for ignition than that for example given by a booster coil for petrol ignition.

Because of the inter-related effects of plug position, chamber shape, method of fuel injection and air flow, the Company are collaborating with manufacturers by providing experimental units to determine the best arrangements for effective ignition in various installations.—*The Plessey Co., Ltd., Ilford Essex.*

Hydraulic tipping dumper

The Muir-Hill 14B 4½ cu. yd. dumper with hydraulic tipping body, which was introduced at the 1954 Public Works Exhibition, is the first hydraulic tipping dumper to be produced by E. Boydell & Co., Ltd. It has been designed to combine the advantages of the standard Muir-Hill dumper with completely controlled tipping speed, varying from five seconds to any desired time, and extreme simplicity of control.

The body is tipped by two single acting telescopic rams situated on the outside of the main chassis members, ensuring that no twist at the linkage points arises when travelling over rough ground. The pump is of the gear type driven through a power take-off from the main gear box.



After engaging the power take-off lever which is situated at the rear of the engine cover, the positive and powerful tip is controlled entirely by the familiar accelerator and clutch pedals, the maximum tipping angle being 65° to the horizontal.

The speed of discharge varies from almost instantaneous to complete control of a constant or intermittent flow.

The body is simply reset in five seconds without the complications of a double acting hydraulic ram system, as snubbing springs and chains are fitted between the body and chassis to provide positive pull-back to initiate the gravity body reset.

The body has been designed specifically as a tipping unit with a flat level floor and scow mouth, the whole unit being braced to withstand arduous conditions.—*E. Boydell & Co., Ltd., Old Trafford, Manchester.*

Trade Publications

'Aluminium news'

The Aluminium Union, Ltd., have sent us an interesting publication called 'Aluminium News,' which is printed in Canada for distribution in several languages, 'for the friends of Aluminium, Ltd., and its associated companies, as a source of information about developments in the aluminium industry.'

Last October's issue is extraordinarily interesting for this type of publication. On the very first page is a gossip column of international extraction and subsequent pages are just as interesting in spite of a rigid adherence to aluminium application. The printing is first-class and accompanying photographs are laid out with skill.

The address of the Aluminium Union, Ltd., in this country, is The Adelphi, John Adam Street, London, W.C.2.

Monel data sheets

A new series of data sheets is being issued by Henry Wiggin & Co., presenting, in concise form, essential physical and mechanical data on wrought high-nickel alloys. The second in the series, dealing with Monel, a corrosion-resisting nickel-copper alloy of wide engineering application, has just been issued.

Copies of this and of the first in the series, dealing with Nimonic 90 for springs, are obtainable from Publications Department, Henry Wiggin & Co., Ltd., Thames House, Millbank, London, S.W.1.

Solderless wiring

A brochure by the Plessey Co., Ltd., of Ilford, Essex, outlines the advantages of solderless wiring, and some of the many uses to which the process can be applied. The Company say that with the established use of the process in the aircraft industry, and the development of its application to heavy cables and terminals by the use of the hexagonal crimping technique, a very wide field of industrial application.

Laboratory apparatus

Baird & Tatlock (London), Ltd., publish comprehensive details of their products which include bomb calorimeters, continuous-flow photoelectric absorptiometers for process control and the well-known Haldane gas analysis apparatus. These leaflets are collated in convenient folders and are available from Baird & Tatlock (London), Ltd., Freshwater Road, Chadwell Heath, Essex.

Conveyor pulleys

Crofts (Engineers), Ltd., Bradford 3, will provide copies on application of their latest publication on the subject of cast iron conveyor pulleys, which provides descriptive details of pulleys manufactured for varying duties.

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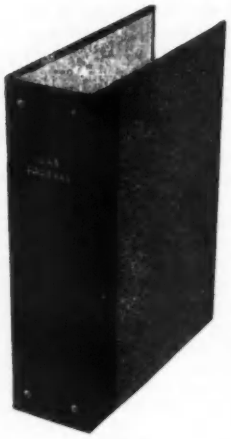

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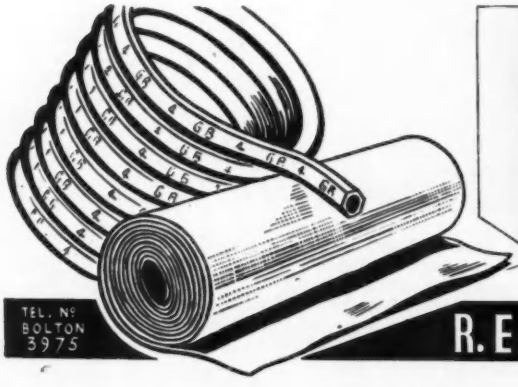

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Classified Advertisements: All small classified advertisements are charged at 1/9 per line (approx. 7 words)—minimum charge 10/6. A Box Number address occupies 2 lines, and a further 6d. is charged towards cost of postage on replies. Copy must be received by first post on Monday to ensure insertion in that week's Journal.

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MIDLANDS MANAGER: G. B. Torrance, 42, Wychall Lane, King's Norton, Birmingham, 30. *Telephone:* Kings Norton 3868

NORTHERN MANAGER: Philip W. B. King, Flat 1, 7 Langcliffe Avenue, Harrogate. *Telephone:* Harrogate 67625.

SOUTHERN REPRESENTATIVE: A. Engelhardt, 11, Bolt Court, Fleet Street, E.C.4. *Telephone:* Central 2236-7

WALTER KING, LTD., 11, Bolt Court, Fleet Street, London, E.C.4.

Telephone: CENtral 2236-7. *Telegrams:* Gasking, Fleet, London.

OXIDE

DUTCH AND DANISH BOG ORE
SPECIALLY ACTIVATED OXIDE OF IRON

Oxide supplied on loan or sale outright.
Highest prices paid for Spent Oxide

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GAS PURIFICATION & CHEMICAL COMPANY LIMITED

ESTABLISHED 1873

PALMERSTON HOUSE, BISHOPSGATE, LONDON, E.C.2.

Telegrams: "Purification, Stock, London." Telephone: London Wall 5077

FIRE FIEND v. NU-SWIFT

We know who will win. Please send us details of your wonderfully rapid and reliable Fire Extinguishers—before it is TOO LATE!

Name.....

Address.....

Post now to Nu-Swift Ltd., Elland, Yorks. —AHEAD OF THE FIRE FIEND'S VISIT!

In Every Ship of the Royal Navy

"KLEENOFF" *
THE COOKER CLEANER

"KLEENOFF"
FIBRE BRUSHES
RUBBER MOPS

"KAY-DEE" *
KETTLE DESCALER

For resale to the public, and in bulk for works use.

BALE & CHURCH, LTD.
7, CROMPTON WAY, CRAWLEY, SUSSEX

APPOINTMENTS VACANT

The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 inclusive or a woman aged 18-59 inclusive unless he or she, or the employment, is excepted from the provisions of the Notification of Vacancies Order, 1952.

PLANNING and Development Engineer with experience in Gas Heating and Cooking Appliances required by old established Company in the Midlands. Contributory Pension Scheme in operation. Application stating age, education, experience and salary required should be addressed to: No. 221, *Gas Journal*, 11, Bolt Court, Fleet Street, London, E.C.4.

WEST MIDLANDS GAS BOARD

WOLVERHAMPTON AND DISTRICT DIVISION
TECHNICAL ASSISTANT (WORKS)—BILSTON DISTRICT

CANDIDATES should have theoretical and practical experience in the operation and control of continuous Vertical Retorts, Water Gas Manufacture and Purification.

The duties also entail acting as sick and holiday relief during the absence of the Relief Shift Superintendent.

The salary for the post will be within Grade 5 (£500-£580 per annum) in Grade 5 of the National Salary Scales for Gas Staffs.

The post is pensionable and the successful candidate may be required to pass a medical examination.

Applications, stating age, personal details and experience, together with the names of two referees, should be addressed to Mr. Stanley Jones, Divisional General Manager, West Midlands Gas Board, Wolverhampton and District Division, Kensington House, Bath Street, Dudley, Worcs., to reach him within fifteen days of the appearance of this advertisement.

J. C. INGRAM,
Secretary to the Board.

WEST MIDLANDS GAS BOARD

WORCESTERSHIRE-HEREFORDSHIRE DIVISION
DISTRICT INSPECTORS

THERE are two vacancies, one at Redditch Group and the other at Kidderminster Group.

Candidates must have a sound knowledge of domestic appliances, gasfitting and consumer service generally, and preferably some knowledge of main and service laying. The possession of the City and Guilds of London Final Certificate in Gasfitting would be an advantage.

The salary will be within Grade 5 (£500-£580 per annum) of the National Salary Scales for Gas Staffs.

The posts are pensionable and the successful candidates may be required to pass a medical examination.

Applications, giving age, qualifications, details of training and experience, together with the names of two referees and stating the Group for which application is being made, should be addressed to Mr. C. F.W. Rendle, Divisional General Manager, West Midlands Gas Board, Worcestershire-Herefordshire Division, 12, St. Nicholas Street, Worcester, to reach him within fifteen days of the appearance of this advertisement.

J. C. INGRAM,
Secretary to the Board.

WEST MIDLANDS GAS BOARD

WOLVERHAMPTON AND DISTRICT DIVISION
RELIEF SHIFT SUPERINTENDENT—BILSTON DISTRICT

THE SHIFT DUTIES comprise control of Continuous Vertical Retorts, Water Gas Manufacture, Purification, and Steam Production, and the shiftmen engaged thereon.

The Daywork duties involve assisting the Works Technical Staff.

The salary will be within Grade 6 (£530-£610 per annum) of the National Salary Scales for Gas Staffs.

The post is pensionable and the successful candidate may be required to pass a medical examination.

Applications, stating age, personal details, and experience, together with the names of two referees, should be addressed to Mr. Stanley Jones, Divisional General Manager, West Midlands Gas Board, Wolverhampton and District Division, Kensington House, Bath Street, Dudley, Worcs., to reach him within fifteen days of the appearance of this advertisement.

J. C. INGRAM,
Secretary to the Board.

WEST MIDLANDS GAS BOARD

SHROPSHIRE DIVISION
DRIVER—SALESMAN

THE DUTIES include taking charge of a mobile showroom and the canvassing of the consumers within the Division. Candidates should possess a flair for salesmanship and preferably be competent to drive a motor vehicle.

The salary will be within Grade 5 (£500-£580 per annum) of the National Salary Scales for Gas Staffs.

The post is pensionable and the successful candidate may be required to pass a medical examination.

Applications, stating age, education, qualifications and experience, together with the names of two referees, should be addressed to Mr. W. Oldham, Divisional General Manager, West Midlands Gas Board, Shropshire Division, Sidney House, School Court, Shrewsbury.

J. C. INGRAM,
Secretary to the Board.

SCOTTISH GAS BOARD

KILMARNOCK GROUP
GROUP TECHNICAL ASSISTANT

APPLICATIONS are invited for the post of a GROUP TECHNICAL ASSISTANT for the Kilmarnock Group.

The salary will be within the scale A.P.T. 7, Provincial 'A', with placing according to qualifications and experience. The present scale is £585-£665.

Applicants should possess the Higher Grade Certificate (Manufacture) of the Institution of Gas Engineers or an equivalent technical qualification and should be experienced in the operation of all plant usually met with in small and medium sized undertakings.

The post is superannuable and the successful candidate may be required to undergo a medical examination.

Applications, stating age, qualifications and experience, together with the names of two referees, should be addressed to the undersigned within fourteen days from the appearance of this advertisement.

ROBERT FIFE,
Group Manager.

Riverbank Gas Works,
Kilmarnock.
December 28, 1954.

(*Classified advertisements continued on page* 126)

APPOINTMENTS VACANT (ctd.)

EASTERN GAS BOARD

IPSWICH DIVISION
BURY ST. EDMUNDS GROUP

FIRST CLASS GAS FITTER required to work in the Sudbury District. Full J.I.C. Rates of Pay (Provincial 'A') and conditions of service.

The Borough Council have arranged to make a Council House available. The successful candidate may be required to pass a medical examination and to contribute to any pension scheme approved by the Board which may be applicable to him at some future date.

Applications, giving age, present duties and references should be addressed to Mr. H. R. Thomas, Group Manager, Gas Works, Bury St. Edmunds within two weeks of the appearance of this advertisement.

EASTERN GAS BOARD

NORWICH DIVISION
THETFORD DISTRICT

FIRST CLASS GAS FITTER required for the above Undertaking. Full J.I.C. Rates (Provincial 'B') and conditions of service.

A house will be available on a service tenancy for a period of two years or until the successful applicant can find accommodation within that period. The successful candidate will be required to pass a medical examination.

Applications, giving details of age, present duties and references, should be made to the undersigned within fourteen days of the appearance of this advertisement.

L. C. B. WILLIAMS,
Manager, King's Lynn Group.

Eastern Gas Board,
Wisbech Road,
King's Lynn, Norfolk.

EAST MIDLANDS GAS BOARD

APPOINTMENT OF
DIVISIONAL CHEMIST—
SHEFFIELD AND ROTHERHAM DIVISION

APPLICATIONS are invited from suitably qualified persons for the position of DIVISIONAL CHEMIST in the Sheffield and Rotherham Division of the East Midlands Gas Board, at a commencing salary at the rate of £1,000 per annum.

Candidates should have had considerable experience of modern methods of testing applicable in Gas Works, and preferably should hold a degree in chemistry or possess an equivalent qualification.

The successful applicant will be responsible to the Divisional Engineer for the Central Chemical Laboratory and for official gas testing stations. He will also be required to carry out special investigations as may be required.

The position is pensionable and the successful applicant will be required to pass a medical examination.

Applications, giving details of education, training, qualifications and experience, together with the names and addresses of two referees, should be addressed to reach Mr. C. C. Wood, Divisional General Manager, Sheffield and Rotherham Division, East Midlands Gas Board, Commercial Street, Sheffield, 1, not later than February 5, 1955.

A. GWYNNE DAVIES,
Secretary.

Beverley House,
University Road, Leicester.
January 6, 1955.

EAST MIDLANDS GAS BOARD

LINCOLNSHIRE DIVISION
SPALDING GROUP
GROUP DISTRIBUTION FOREMAN

APPLICATIONS are invited for the position of GROUP DISTRIBUTION FOREMAN. The salary will be within Grade A.P.T. 4, Provincial 'A' £335-£525 at a commencing step in accordance with the capabilities of the successful candidate.

Candidates must be capable of supervising district fitters and mains and service layers and should preferably hold a final certificate of the City and Guilds Institute of London in Gasfitting. The position is pensionable and the successful candidate will be required to pass a medical examination.

A house is available at a reasonable weekly rental.

Applications stating age, experience and present position and giving full particulars of training and qualifications together with the names of two referees should be forwarded to Group Manager, East Midlands Gas Board, Albion Street, Spalding, to arrive not later than Saturday, January 29, 1955.

B. CLARKE,
Divisional General Manager.

Lincoln.

EAST MIDLANDS GAS BOARD

LINCOLNSHIRE DIVISION
DRAUGHTSMAN—GRIMSBY GROUP

DRAUGHTSMAN required, preferably with experience in Steel Structures, Pipework and Foundations. Salary will be within A.P.T. Grade 6 of the National Salary Scales for Gas Staffs (£530-£610) according to experience and qualifications.

The position is pensionable and the successful applicant will be required to pass a medical examination.

Applications stating age, education and experience and giving the names of two referees should be addressed to the Group Manager, East Midlands Gas Board, Sheepfold Street, Grimsby, to arrive not later than January 23, 1955.

BERNARD CLARKE,
Divisional General Manager.

Lincoln.
January 6, 1955.

EAST MIDLANDS GAS BOARD

LINCOLNSHIRE DIVISION
DIVISIONAL PERSONNEL OFFICER

APPLICATIONS are invited for the post of PERSONNEL OFFICER in the Lincolnshire Division of the East Midlands Gas Board. Candidates should have a sound knowledge of personnel work generally and, in particular, of the implementation of National and Area agreements on salaries, wages and conditions of employment.

The salary for the post is in accordance with grades A.P.T. 8/9 of the National Scales for Gas Staffs (£625-£755) at a commencing step commensurate with ability and experience.

The position is pensionable and the successful applicant may be required to pass a medical examination.

Applications giving age, qualifications, and details of experience, together with the names of two referees should be addressed to the undersigned to arrive not later than January 23, 1955.

BERNARD CLARKE,
Divisional General Manager.

Belle Vue House,
Carline Road, Lincoln.
January 4, 1955.

CALOR GAS (DISTRIBUTING) CO., LTD., require suitably qualified person for services as FITTER with a mobile training unit. Applicants should, preferably, reside in the Home Counties. Qualifications should include experience of all gas appliances and of the use of copper tubing. Ability to drive and/or fitting shop experience would be an advantage, but not essential. The appointment involves regular travelling in the United Kingdom and is probably more suitable for an unmarried man, but married applicants will be considered. Prior training will be given. Wages will be on a par with standard scales. The appointment is pensionable (non-contributory) after suitable qualifying period. Applications should be sent to The Chief Engineer, Research and Development Division, Coombelands, Addlestone, Surrey.

NORTH WESTERN GAS BOARD

EAST LANCASHIRE GROUP

APPLICATIONS are invited for the following pensionable appointments :—

CHIEF DRAUGHTSMAN
(*Salary within Grade A.P.T. 10—£715-£815 per annum*)

The successful applicant will be required to control the activities of a Central Group Drawing Office, and be responsible for the constructional development and maintenance work on buildings and plant.

Candidates should have contractual experience in a large drawing office, be capable of organisation and handling specifications and contracts, and should hold a recognised qualification of the Institution of Mechanical Engineers or the Higher Grade Certificate in Gas Engineering, or both.

MECHANICAL SUPERINTENDENT—
GREENBANK WORKS, BLACKBURN.
MECHANICAL SUPERINTENDENT—
OSWALD STREET WORKS, BURNLEY
(*Salary within Grade A.P.T. 9—£655-£755 per annum*)

Candidates should have had practical experience in the erection and maintenance of mechanical and electrical plant, and the possession of mechanical engineering qualifications will be an advantage.

The successful applicant will be responsible to the Station Engineer for the maintenance of all mechanical and electrical plant and records at the works, the control of workshops and craftsmen, and for the supervision of mechanical and electrical contractual work as may be required.

Detailed applications, giving the names of two referees, should reach the General Manager, N.W.G.B. (East Lancashire Group), Cardwell Place, Blackburn, within fourteen days.

NORTH WESTERN GAS BOARD

WIRRAL GROUP
GROUP DISTRIBUTION DEPARTMENT—
BIRKENHEAD

APPLICATIONS are invited for the following pensionable appointments :—

TECHNICAL ASSISTANT (DISTRIBUTION)
(*Salary within Grade A.P.T. 8—£625-£705 per annum*)

The successful applicant will be required to carry out all types of technical work in connection with gas distribution.

Applicants should preferably hold the Higher Grade Certificate in Gas Engineering (Supply) of the Institution of Gas Engineers or an equivalent qualification, and should have experience of gas distribution practice.

DRAUGHTSMAN
(*Salary within Grade A.P.T. 7—£585-£665 per annum*)

Applicants should have knowledge of the design and layout of distribution plant including boosters and governors, and plan records of mains systems. A knowledge of surveying and levelling will be an advantage.

Detailed applications, giving the names of two referees, should reach the General Manager, N.W.G.B. (Wirral Group), Hind Street, Birkenhead, within fourteen days.

NATIONAL COAL BOARD invite applications for a superannuable appointment as ASSISTANT to the Head of the By-Products Section in the Marketing Department at London Headquarters. Salary on appointment will be according to qualifications and experience within a scale £1,005 × £35 to £1,380 male, or £855 × £35 to £1,230 female, plus London Location Allowance of £58 minimum rising to £98 at maximum.

The successful candidate must be capable of deputising when necessary for the Head of the Section and be able to represent the Board's interests at trade meetings. Knowledge of tar, benzole and ammonia products is required. An aptitude for commercial activities would be an advantage.

Write, giving full particulars (in chronological order of age, education, qualifications and experience (with dates) to National Coal Board, Establishments (Personnel), Hobart House, Grosvenor Place, London, S.W.1, marking envelope TT/905. Original Testimonials should *not* be forwarded. Closing date January 25, 1955.

SOUTHERN GAS BOARD

NORTHERN DIVISION
OXFORD AND DISTRICT
GAS UNDERTAKING

APPLICATIONS are invited for the following appointments :—

ENGINEERING DRAUGHTSMAN
(*Salary within Grades A.P.T. 7-9—£585-£755*)

Applicants must be qualified to prepare drawings and specifications for all types of gas works plant and equipment, and to supervise its erection and testing.

TECHNICAL ASSISTANT, WORKS
(*Salary within Grades A.P.T. 5-6—£500-£610*)

Applicants must be capable of assisting the Works Engineer in all matters appertaining to the control of gas works plant and labour.

TECHNICAL ASSISTANT, DISTRIBUTION
(*Salary within Grades A.P.T. 5-6—£500-£610*)

Applicants must be capable of assisting the Distribution Engineer in the design, installation and operation of distribution plant and mains, and of district gasholder stations.

In each case, placing within the grades will be according to the qualifications and experience of the candidate. The successful applicants will be required to pass a medical examination and, unless already subject to a Pensions Scheme by virtue of the Gas (Pension Rights) Regulations, 1950, will be required, if eligible, to join the Board's Staff Pension Scheme.

Applications, stating age, education, qualifications, training, present appointment and salary, together with a one page summary of these particulars, should be sent by January 29, to :—

S. C. BENTLEY,
Engineer and General Manager.

P.O. Box No. 3,
Therm House,
St. Aldates, Oxford.
January 7, 1955,

PATENTS

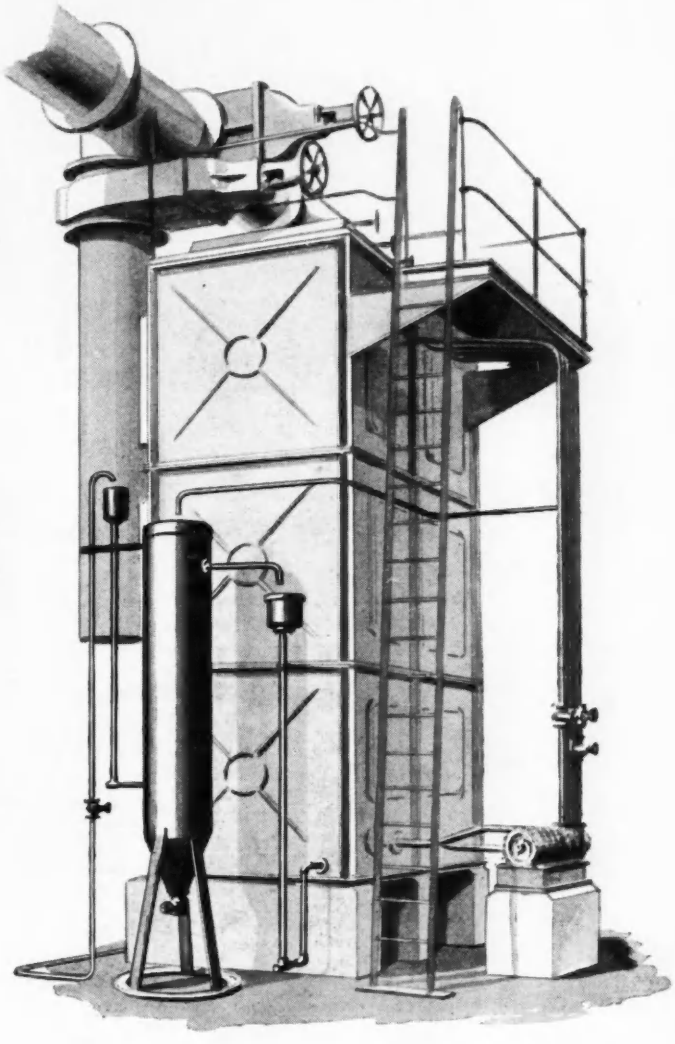
KINGS PATENT AGENCY, LTD
(Director, B. T. King, A.I.M.E., Patent Agent) Advice, Handbook, and Consultations free. 146a, Queen Victoria Street, London, E.C.4. 'Phone: City 6161.

COMPRESSORS & EXHAUSTERS FOR AIR AND GAS.
See our Advertisement Next Week.
REAVELL & CO. LTD. IPSWICH.

CASES FOR BINDING
Quarterly Volumes of the 'Gas Journal'
7/6 each, post free
Walter King, Ltd., 11, Bolt Court, Fleet Street, London, E.C.4.

FINAL AMMONIA WASHERS

Experience at Rossendale



" Prior to its installation we had continuous trouble with the circulating pumps, having to dismantle for cleaning approximately each two or three weeks. In addition, the motors burned out occasionally because the pumps had seized.

Since installing the softener in October, 1951, we have not had the slightest trouble with the pumps; they have run continuously without fault, and we are very pleased with the installation, particularly because it is so simple and requires so little attention."

(By courtesy of the North Western Gas Board)

The hard water enters the vessel along with a small amount of liquor (approximately 5% the water rate) from the second bay. Calcium carbonate is deposited and can be removed from the hopper at long intervals. Clear treated water is taken off above the hopper and run into the existing tundish on the washer.

COST—MATERIALS NIL

Water so softened is suited for use in ammonia removal in " Multifilm " Washers and similar equipment. It must not be assumed that such treatment fits the water for domestic use or for boiler feed.

Patent Number B.P.699,620.

A remedy for hard water conditions

FOUNDED 1850 HOLMES HUDDERSFIELD

W. C. HOLMES & CO. LTD.

HUDDERSFIELD · LONDON · BIRMINGHAM

Tel : Huddersfield 5280 London : Victoria 9971 Birmingham : Midland 6830

C 42/58

we serve to burn

"Fishtail" type burner *with two-armed stamped pattern injector for heating liquid in tanks by submerged horizontal combustion tubes. For use with low pressure gas supplies.*
Size Range: *1", 1¼", 1½", 2" and 2½" outlets.*
Capacity Range: *45-280 cu. ft. of gas per hour.*

Note.—These four burner heads are for high pressure gas or low pressure gas and air blast.

Brass non-blow-off head types: *deal with 5 to 10 cu. ft. of gas per hour.*

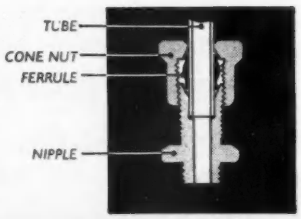
Stainless steel, "F" type head, burner: *deals with 8 cu. ft. of gas per hour.*

Perforated head type burner: *deals with 10 or 15 cu. ft. of gas per hour.*

Type 2 Mixture Controller, *for controlling quality of air/gas mixture irrespective of varying pressures and resistances. Temperature control is varied by manipulation of the air cock only.*
Capacity Range: *from 130 to 1380 cu. ft. of gas per hour according to air pressure (½ lb. to 1 lb.) and size. For low pressure gas systems.*
Air Inlets: *1", 1¼", 1½" and 2" diameters gas thread.*

DID YOU KNOW?

KEITH BLACKMAN have been making compression joints for many years and the present design embodies features developed as a result of this long experience. Notice that the shape of the ferrule is such that the joint is made without unduly stressing the tube.



INDUSTRIAL GAS EQUIPMENT

Keith Blackman LIMITED
MILL MEAD ROAD, TOTTENHAM, LONDON, N.17
'Phone: Tottenham 4522 (twelve lines). 'Grams: "Keithblat, Norphone, London."
BRANCH OFFICES: AT MANCHESTER, BIRMINGHAM, LEEDS, GLASGOW, NEWCASTLE-ON-TYNE, PENARTH near CARDIFF, AND BELFAST

510

MAKING ENDS MEET

An easy task when you use "Securex" Solderless Compression Joints. Fitted in two minutes, only the special expanding tool and a spanner are required to make modern plumbing a dream.

To make a good compression joint you must expand the copper tube.

'Securex' has been successfully proved in many famous buildings, for over 25 years, for Water, Gas, Steam-heating and Hydraulic systems.

'Securex' has been specified for :-

St. Bartholomew's Hospital, London. St. Andrew's House, Edinburgh.
British Broadcasting House, London. Cumberland Hotel, London.

And in Buildings in all parts of the world.

Be wise and specify 'Securex'. We will be pleased to send full details on request.

JAMES H. LAMONT & CO. LTD.

ENGINEERS — BRASSFOUNDERS

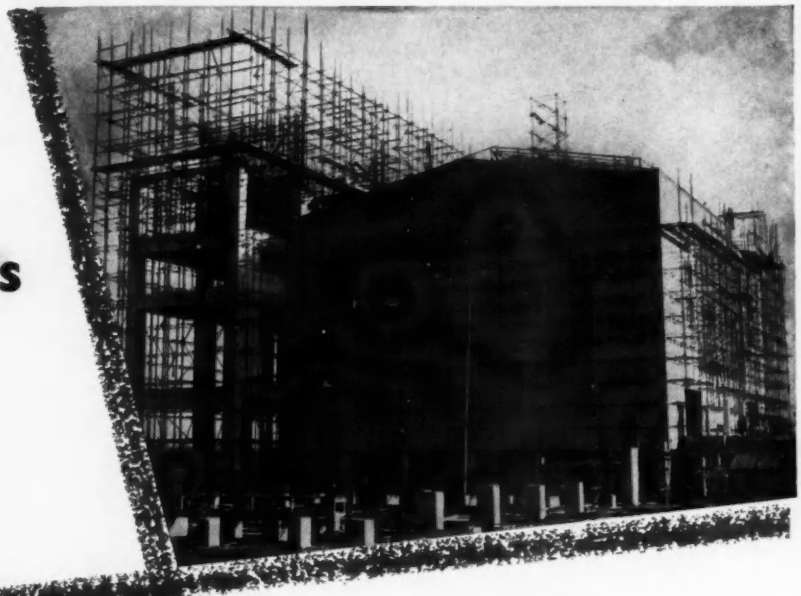
GYLEMUIR WORKS, CORSTORPHINE, EDINBURGH 12, SCOTLAND
Telephone . Corstorphine 66641-2 *Telegrams:* "Solderless, Edinburgh"
LONDON OFFICE: **NORFOLK HOUSE, LAURENCE POUNTNEY HILL, E.C.4**
Telephone: Mansion House 5700 *Telegrams:* "Yutaka Cannon, London"

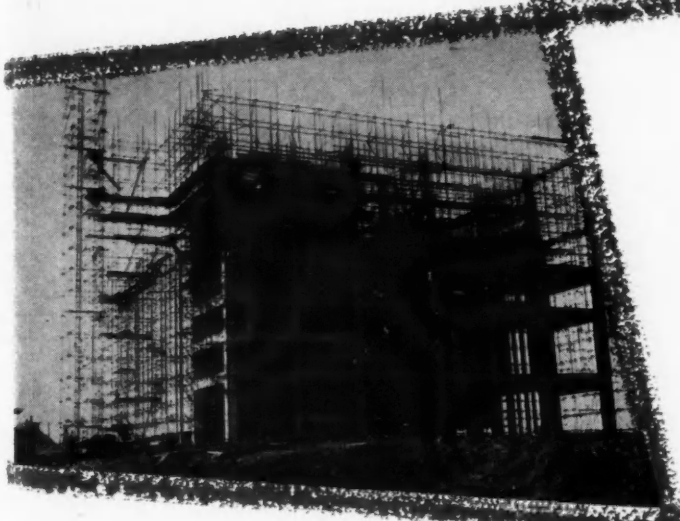
SECUREX SOLDERLESS COMPRESSION JOINTS

Registered as a Newspaper. Printed by STRAKER BROTHERS LTD., E.C.2 for WALTER KING LIMITED, 11, BOLT COURT, FLEET ST., LONDON, E.C.4, Wednesday, January 12, 1955

C.O.L

INTERMITTENTS AT PRESTON





Two progress photographs of the first half of the ultimate 8,000,000 cu. ft per day installation of C.O.L. Intermittent Vertical Chambers under construction at Lostock Hall Works, Preston, for the North Western Gas Board. Above : First chamber house, with foundation for second house in foreground. Left : Coal and coke bunkers under construction.

(Photograph by courtesy of the North Western Gas Board)

WEST'S

GAS IMPROVEMENT COMPANY LIMITED
(C.O.L. DIVISION)

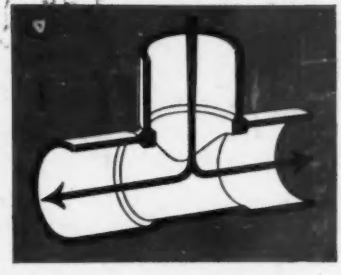
Chandos House, Buckingham Gate, London S.W.1

Telephone: ABBey 6912

WP2

For strength and durability

Tinned throughout for immediate use!



Ideal Full-way Fittings are TINNED THROUGHOUT and ready for immediate use. No cleaning is necessary, therefore no time is wasted by having to scour with steel wool on the inside to prepare them for soldering. This reduces the possibility of imperfect joints caused through faulty cleaning and overcomes frayed tempers or fingers brought about when working with small-bore tubes and fittings. Besides the reduction in installation costs there is less possibility of corrosion. They provide free, unrestricted flow as the tube seats against the shoulder of the sockets in the fitting and the bore is therefore flush throughout. They are unaffected by hot water or by temperatures below freezing point and the joints are actually stronger than the tube itself. Most suitable for use in confined spaces, they are uniform and interchangeable and manufactured for use with light gauge copper tube to Nos. B.S.S. 659 and B.S.S. 1386.

An illustrated booklet giving full details and prices of the complete range of fittings and accessories is available from our Builders' and Plumbers' Merchants' Stockists in all districts. If there is any difficulty in obtaining a copy, please write direct to the address below.

IDEAL FULL-WAY FITTINGS

FOR COPPER TUBING

300 IDEAL-Standard

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IDEAL BOILERS & RADIATORS LIMITED · IDEAL WORKS · HUL